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(REG. U. S. PAT. OFF.)

Sturtevant Marine Heaters have proved themselves satisfactory for use on board ship. They are very flexible and provide for a wide range of temperatures by steam control. Further control is made possible by the use of a damper and by-pass. Air may be obtained all cold, all hot, or may be mixed to secure any final temperature.

The heaters are made with casings that are both air-tight and water-tight so that they may be placed in exposed locations. Casings are in two pieces, and are split horizontally, a rubber gasket being placed between the top and bottom sections where they are bolted together. These heaters are made to operate in connection with Sturtevant Fans.

When compared with competing heaters the following out-standing advantages should be particularly noted:—

Accessibility and ease of repair due to simplicity of construction.

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Higher efficiency of the heating surface due to staggered pipes:

Positive circulation of steam in the heating coils.

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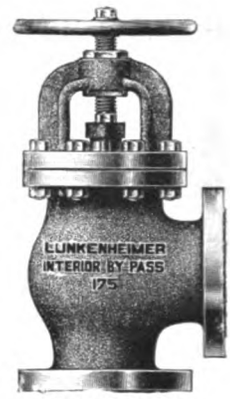

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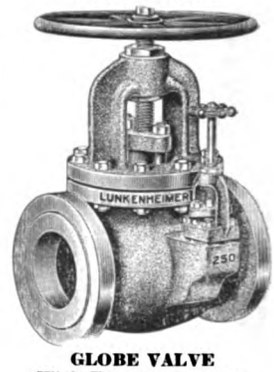

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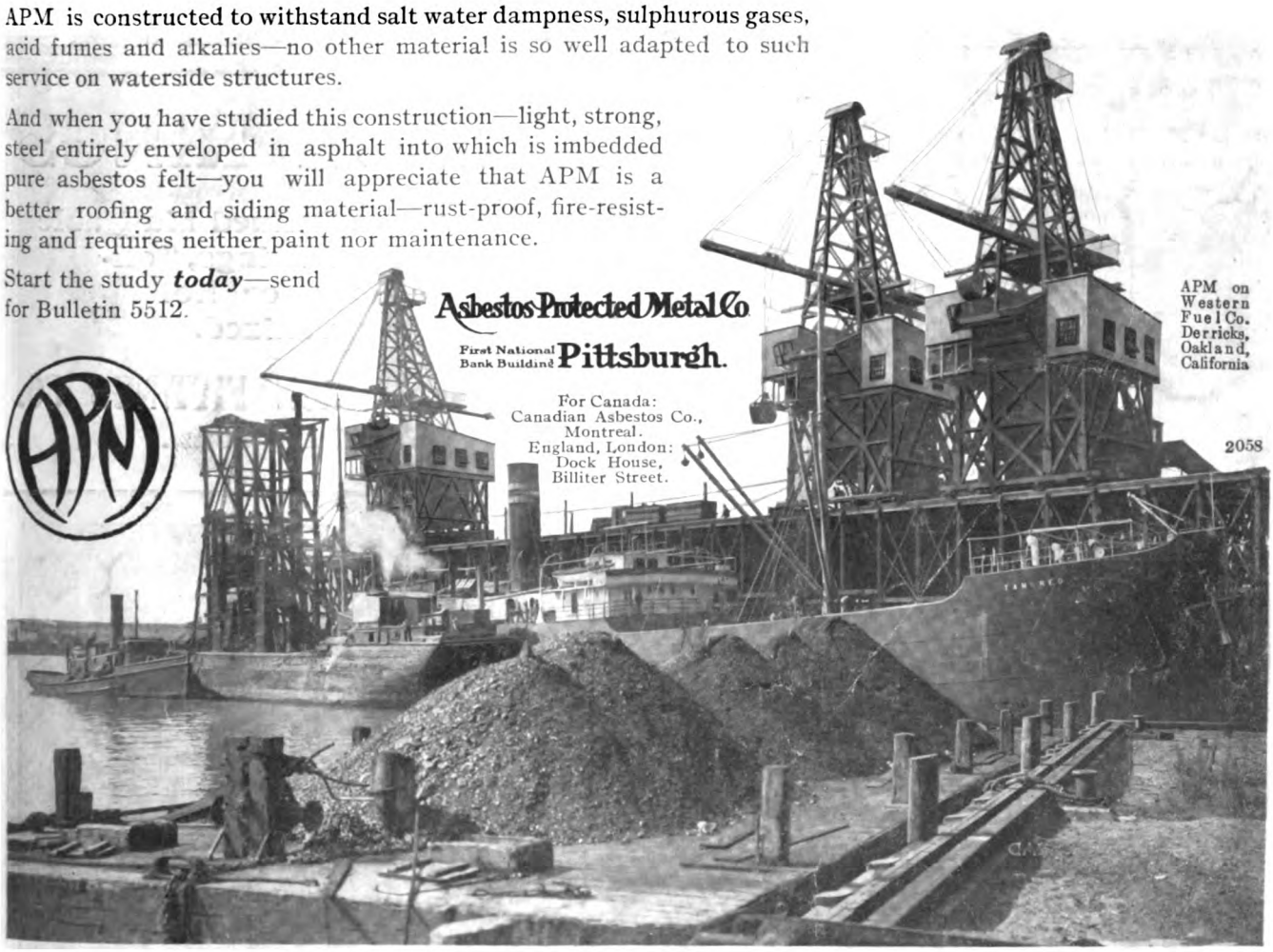

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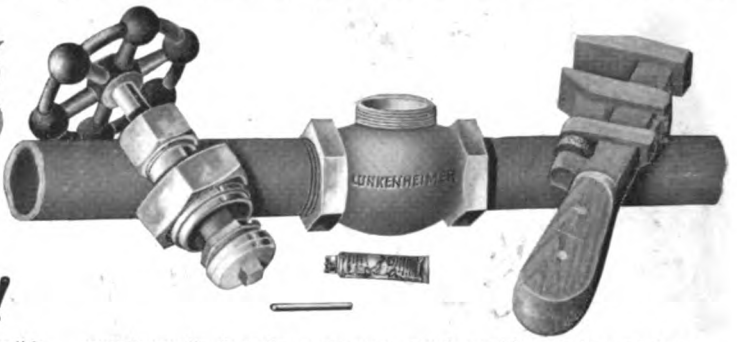
LUNKENHEIMER

Regrinding Valves



— *the best by test!*

Lunkenheimer Regrinding Valves have been subjected to every possible test which years of hard service can provide, and have in all cases proven their unequalled durability.

The material used is not a *brass*, but an excellent grade of *bronze*, a much harder alloy of copper and tin, and having a tensile strength of 35,000 pounds. This accounts, in a large degree, for their exceptional wearing qu ties. The design embodies but few, large and liberally proportioned parts made to gauge and interchangeable.

Should the seating surfaces wear after continued use, they can easily be reground, usually the only process necessary for making repairs; and this operation can be repeated quite a number of times during the life of the valve. It is safe to presume that a Lunkenheimer Regrinding Valve will outlast the connecting pipe.

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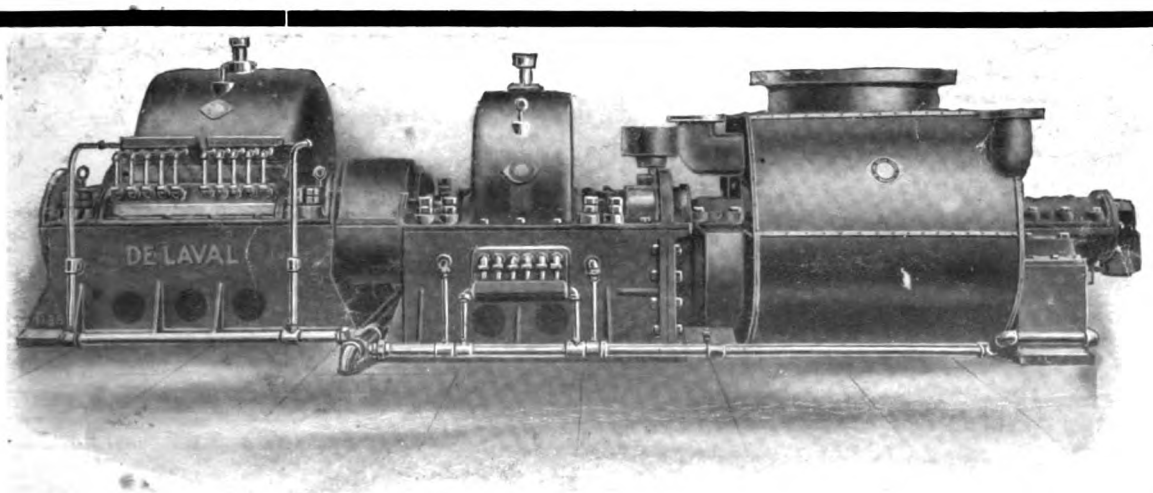

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The De Laval helical speed-reducing gear has been developed especially for heavy-duty service in connection with De Laval steam turbines. The design of the gear and frame, and the methods used to secure correct tooth contour and spacing, represent experience accumulated in years ofpractical application of helical gears for all classes of service. Over 150,000 HP of De Laval marine turbines and gears are in use or under construction.

All parts of De Laval marine turbines and gears are made on a limit-gage basis and hence are interchangeable. Accurate fits are thereby insured for all wearing parts, such as bearings, turbine buckets, packings, pinions, etc. They meet the requirements of Lloyd's Register of Shipping.

Every De Laval Machine is guaranteed as to power and efficiency and is given a careful mechanical test before it leaves the shop. Ask for Special Bulletin O-46.

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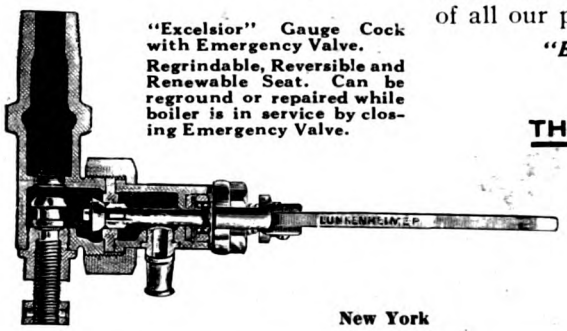
Gauge Cocks and Fusible Plugs

Regrinding Gauge Cock

Mississippi Gauge Cock



"Excelsior" Gauge Cock with Emergency Valve. Regrindable, Reversible and Renewable Seat. Can be reground or repaired while boiler is in service by closing Emergency Valve.

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Our FUSIBLE PLUGS conform to the rules of the Department of Commerce, Steamboat Inspection Service, and are accepted by all local Inspectors.

The casings of these plugs are made of our High Duty Bronze, the fusible core being pure Banca Tin.

Lunkenheimer "Quality" materials and workmanship insure in them an accuracy and safety characteristic of all our products.

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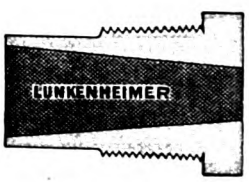

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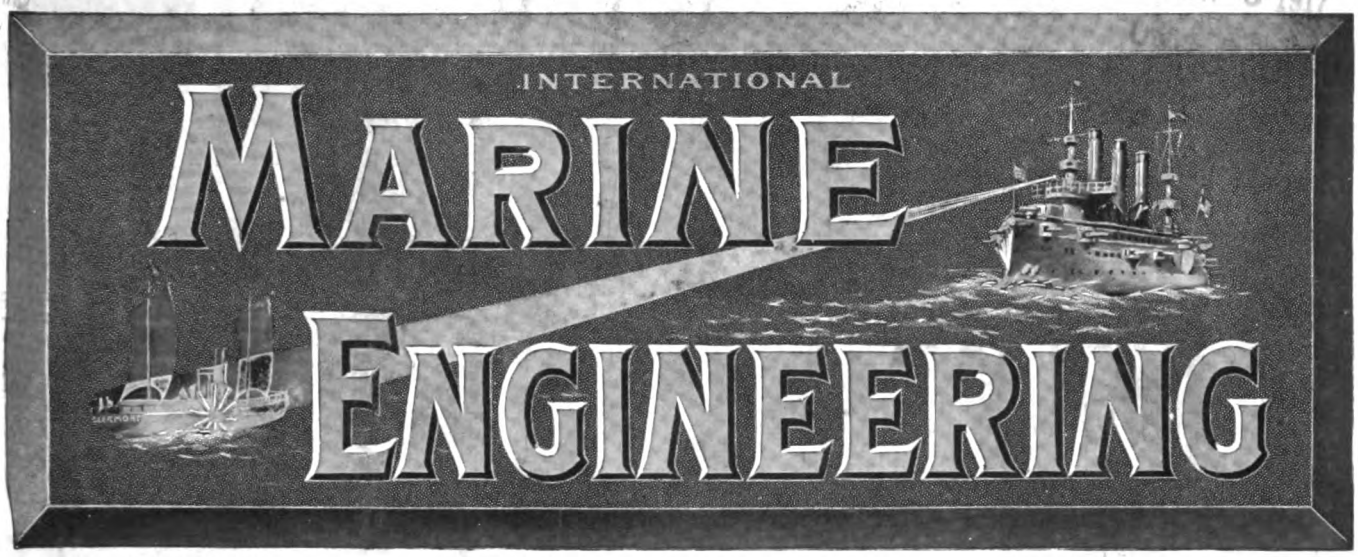

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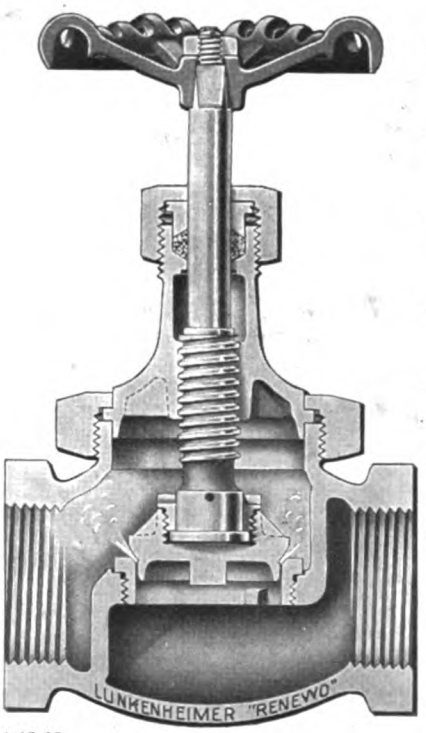
—Inside Information for Valve Users



- Self-cooling hand-wheel secured to stem by lock nut.
- Stem of Lunkenheimer "Stem-Bronze."
- Large and deep Stuffing Box, packed for service.
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- Original Union Bonnet protects thread from action of steam. Forms guide for Regrinding.
- Renewable Nickel Seat and Disc have regrinding seating surfaces. Disc is provided with Lunkenheimer "Seat guard."
- Flow areas in excess of pipe areas.
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- Body of Lunkenheimer "Valve Bronze."

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The LUNKENHEIMER "Renewo" Valve

from its very inception has been so far ahead of every other valve of this type as to be in a class by itself. It incorporates improvements, which, though simple, enhance its durability and make it practically indestructible.

The seat and disc—the parts subjected to the most wear, have regrinding seating surfaces; they are made of a High Nickel Alloy having exceptional wearing qualities, and to further enhance their durability the disc is provided with the well-known Lunkenheimer "Seat-guard" which materially aids in preserving the seating surfaces and keeping them clean. Besides, both the seat and disc can easily be renewed.

The other parts are in keeping with the well-known high standard of design, material and workmanship which characterizes all Lunkenheimer products.

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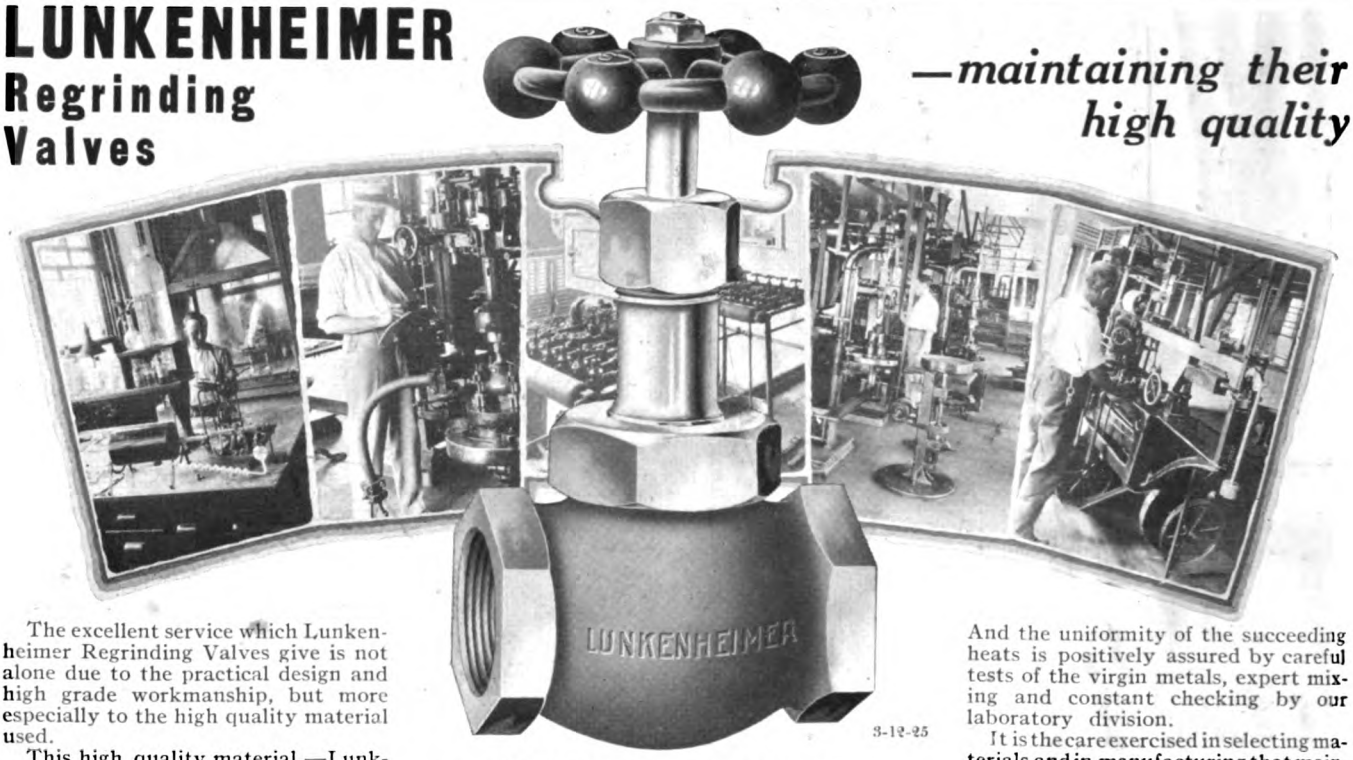
LUNKENHEIMER
Regrinding Valves

—maintaining their high quality



The excellent service which Lunkenheimer Regrinding Valves give is not alone due to the practical design and high grade workmanship, but more especially to the high quality material used.

This high quality material,—Lunkenheimer "Valve-bronze", is the result of scientific study combined with actual working tests. Its composition, varying for the different parts so that each part will give maximum service, insures long life to the valve. It combines great strength with excellent wear-resisting qualities. And the uniformity of the succeeding heats is positively assured by careful tests of the virgin metals, expert mixing and constant checking by our laboratory division.

It is the care exercised in selecting materials and in manufacturing that maintains the "high quality" of the valve and guarantees to the user that service which only Lunkenheimer Valves give.

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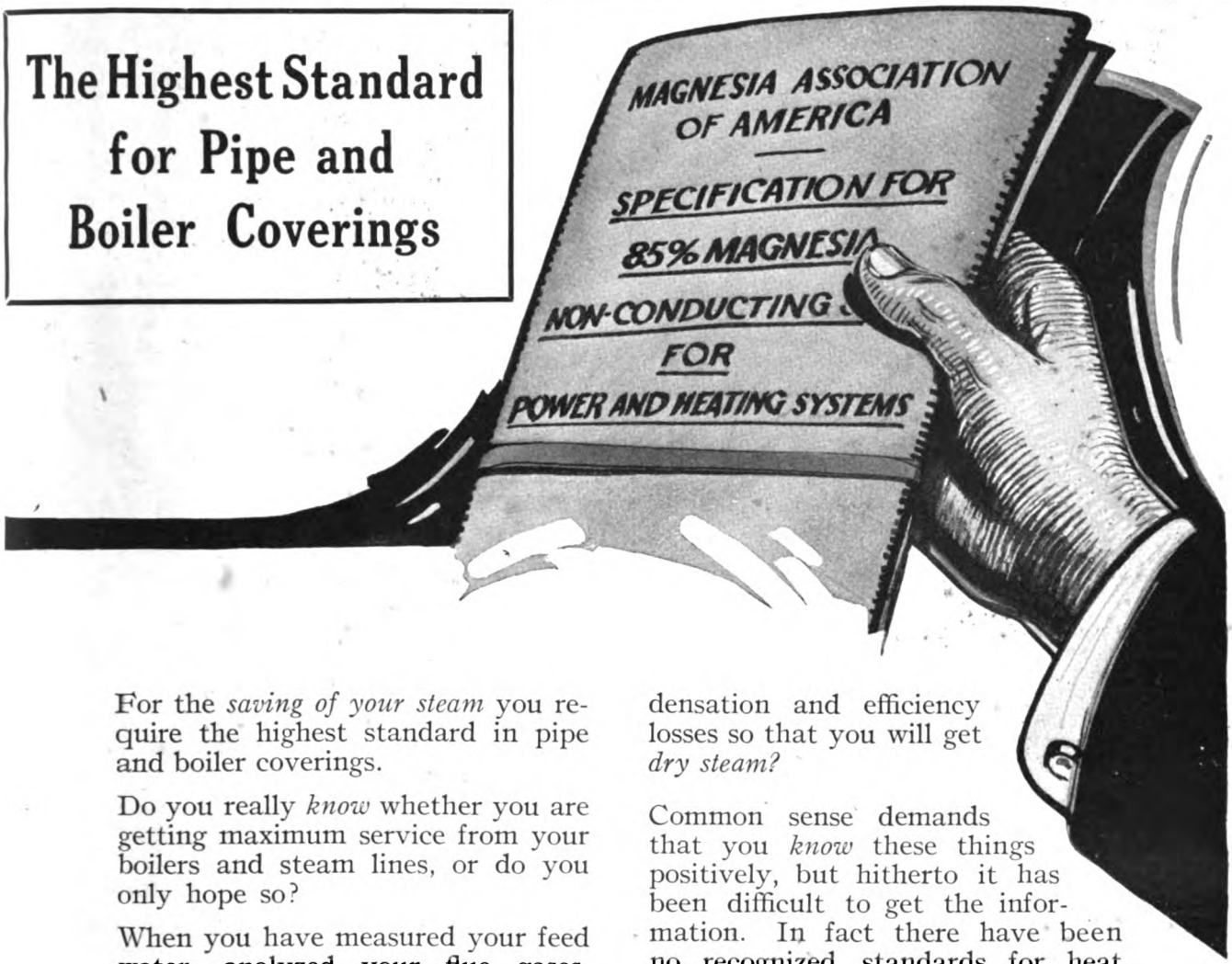

For the *saving of your steam* you require the highest standard in pipe and boiler coverings.

Do you really *know* whether you are getting maximum service from your boilers and steam lines, or do you only hope so?

When you have measured your feed water, analyzed your flue gases, tested your coal and weighed your ashes—What next?

Are your boilers and settings properly and permanently safeguarded against infiltration and heat leakage? Are your steam lines so covered as to give the maximum protection against condensation and efficiency losses so that you will get *dry steam?*

Common sense demands that you *know* these things positively, but hitherto it has been difficult to get the information. In fact there have been no recognized standards for heat insulation.

The *Magnesia Association Specification* shows the correct insulation for pipes and boilers of every description, from low pressure heating systems up to high pressure and superheat installations.

The complete and scientific Specification, issued by the Magnesia Association of America, is sent free to any one interested in the correct application of "85% Magnesia"

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Cook's Metallic Packing, which is stated to be especially adapted for marine service, is the subject of an illustrated catalogue published by the C. Lee Cook Manufacturing Company, Louisville, Ky.

"Speeding To-day Means Money," according to the Brownhoist Catalogue published by the Brown Hoisting Machinery Company, Cleveland, Ohio. "In shipyards Brownhoist cranes are a big help in getting out the work in quick time by speedily handling all lifts. They cover lots of ground and work night and day. They are made in various capacities and with different lengths of boom."

"Let Us Estimate on Anything You Need" is the request made in a bulletin published by the Manufacturers Contracting Company, 2608 North avenue, Bridgeport, Conn. The bulletin goes on to state that on windlasses, control apparatus, etc., steam, electric and marine specialties, shop equipment or supplies, "we can sell anything you wish to dispose of—supplies, ships or complete plants."

"Fuel Economy" is the title of a bulletin published by the Nelson Blower & Furnace Company, 17 Elkins street, South Boston, Mass. This bulletin describes Galusha gas producers. These gas producers are stated in the bulletin to occupy only about one-third of the space required for a marine boiler; to produce power at one-fourth the cost of steam and one-tenth the cost of gasoline; besides being smokeless, cinderless and odorless.

Hanna Riveters for shipyard use are described in a catalogue published by the Hanna Engineering Works, 2075 Elston avenue, Chicago, Ill. "The results obtained from a Hanna riveter in the construction of modern ships will soon pay for even the most expensive types of handling equipment. We manufacture riveters in more than 115 sizes, any of which can be arranged for use as portable or stationary punches by the addition of a dash-pot mechanism."

Wolverine Marine Engines are described in Catalogue R, just published by the Wolverine Motor Works, Bridgeport, Conn. "During the past thirty years Wolverine engines have been giving the most satisfactory service in commercial craft of all kinds. An engine that has proved its reliability for commercial work, such as prompt delivery of mail and perishable goods—fruit, fish, etc.—is eminently suited for use in pleasure craft where the lives of those on board—the owner, his family and friends—are at the mercy of the propelling engine."

Bolts, Nuts, Rivets, etc., are the subject of a very complete and fully illustrated catalogue of 176 pages, which has just been published by Russell, Burdsall & Ward Bolt & Nut Company, Port Chester, N. Y. "With a view of illustrating the styles of bolts and nuts now most generally used, and to afford to our customers a medium suggestive of what may meet their requirements, we have carefully prepared this catalogue and illustrated it with correctly proportioned cuts of some of our leading varieties. In order to promptly meet the needs of our customers we keep a stock of these varieties on hand. We are in a position to make to order, from drawings, bolts and nuts specially designed to meet individual requirements."

"The Monthly Stock List," published by the Bourne-Fuller Company, Cleveland, Ohio, will be sent free to any of our readers upon request. "In issuing from month to month our stock list of materials on hand for immediate shipment, it is our purpose to have the list as accurate as possible and representative of the condition of our stocks. However, the daily shipments from same result in constant fluctuations in the stocks, and due to the present unusual demand following delayed deliveries from the mills, the fluctuations are at this time greater than usual. At the same time our stocks are being constantly replenished; and while we may be short or out of certain items at the time reference is made to the list, we will also probably have on hand material in addition to that shown in the list. We will appreciate, therefore, inquiries for prompt warehouse shipments of any or all sizes usually carried; but for reasons mentioned above, we must ask the trade to appreciate that the list as issued is necessarily subject to change and that the materials are offered subject to prior sale."

A drop-forged tool catalogue has just been published in Spanish by J. H. Williams & Company, Brooklyn, N. Y. This is probably the first catalogue of tools of the type shown to be issued in Spanish. Copies will be sent free to our readers upon request.

"An Ideal Labor-Saving Combination" for shipyard transportation is described in a catalogue published by the Orenstein-Arthur Koppel Company, Koppel, Pa. "The Electromobile industrial truck replaces from three to ten men, often paying for itself in less than a year. Our engineers will cooperate with you in designing the most efficient equipment for your needs."

"Beautful Boats and How to Care for Them" is the title of a handsome catalogue, printed in several colors, which has just been issued by the Murphy Varnish Company, Newark, N. J. "Murphy Transparent Spar Varnish and Murphy Enamels have been used many years by discriminating boat builders. They were recently used upon 550 war boats built at Bayonne by the Elco Company; upon many United States battleships built at Camden, N. J., by the New York Shipbuilding Company; upon that great white fleet which sails from the hot sun of the tropics to the frozen coast of New England every week all winter, and upon merchantmen, war cruisers, motor boats and passenger ships built in many ports."

The "Thor" No. 72 Portable Pneumatic Grinder is described in a bulletin just published by the Independent Pneumatic Tool Company, 1307 Michigan avenue, Chicago. This grinder is equipped with Vanadium pressed steel connecting rods and pistons, Corliss valves and roller bearings. It may be used as a saw for cutting grooves in wooden ships. "This work may be done at a great saving of time, labor and expense by using the No. 72 Thor Portable Pneumatic Grinder, fitted as a saw. This is done by making up an iron cage with side handles and front handle, which is used for steadying the machine and clamping onto the usual hand grip on the spindle bearing. In making the grooves the usual procedure is to cut two slots 3½ inches apart, and then take a mallet and chisel and split out the wood in between. This work may be done in one-third the time required to saw the grooves by hand."

Steel equipment for ships, including ship berths, ship beds and general steel equipment for ship use, is the title of Catalogue 17, which has just been published by the Bernstein Manufacturing Company, Department C, Third and Allegheny avenue, Philadelphia, Pa. "In presenting this catalogue of steel equipment for ships we illustrate a line of equipment which we have been building and developing for many years. Consistent with 'Bernstein Policy,' this equipment has been designed and developed with a primary consideration to strength and practical adaptability, and in every detail of manufacture 'Bernstein Quality' standards have been maintained. We are in position to execute large or small contracts promptly and intelligently. Inquiries and correspondence solicited. Give our Service Department a place in your organization."

The uses of open heaters in connection with the heating, metering and softening of water for boiler and other purposes are exhaustively treated in a 100-page book lately issued by the Harrison Safety Boiler Works, Philadelphia, Pa. The amount of fuel that can be saved by the use of exhaust steam to heat feed water is first explained, and a convenient diagram is given by which the percentage of fuel saving in any given case can easily be ascertained. The essential parts of an open feed-water heater are then considered, after which there are chapters on heating boiler feed in condensing steam power plants, including various arrangements to be used where the supply of exhaust steam is excessive or deficient, the effects of open heaters in connection with exhaust steam heating and drying systems, exhaust steam heating in connection with condensing steam power plants; including the use of bleeder and mixed flow turbines, the utilization of the open feed-water heater as part of a hot process water softener, by which means it is claimed more complete and rapid removal of scale-forming matter is obtained; the subject of softening boiler feed water in condensing power plants, the metering of feed water in open heaters, the heating of water for purposes other than boiler feed, such as hot water heating, water for paper mills, laundries, packing establishments, tanneries, etc. Finally, there is a point by point comparison of the open heater, as represented by the Cochrane feed-water heater, with the closed or pressured type of heater, ending finally with suggestions for the specification of an open feed-water heater. This book covers in a very complete manner the important matters of handling feed water and exhaust steam, and should be of value to those who design, manage or operate steam power plants.

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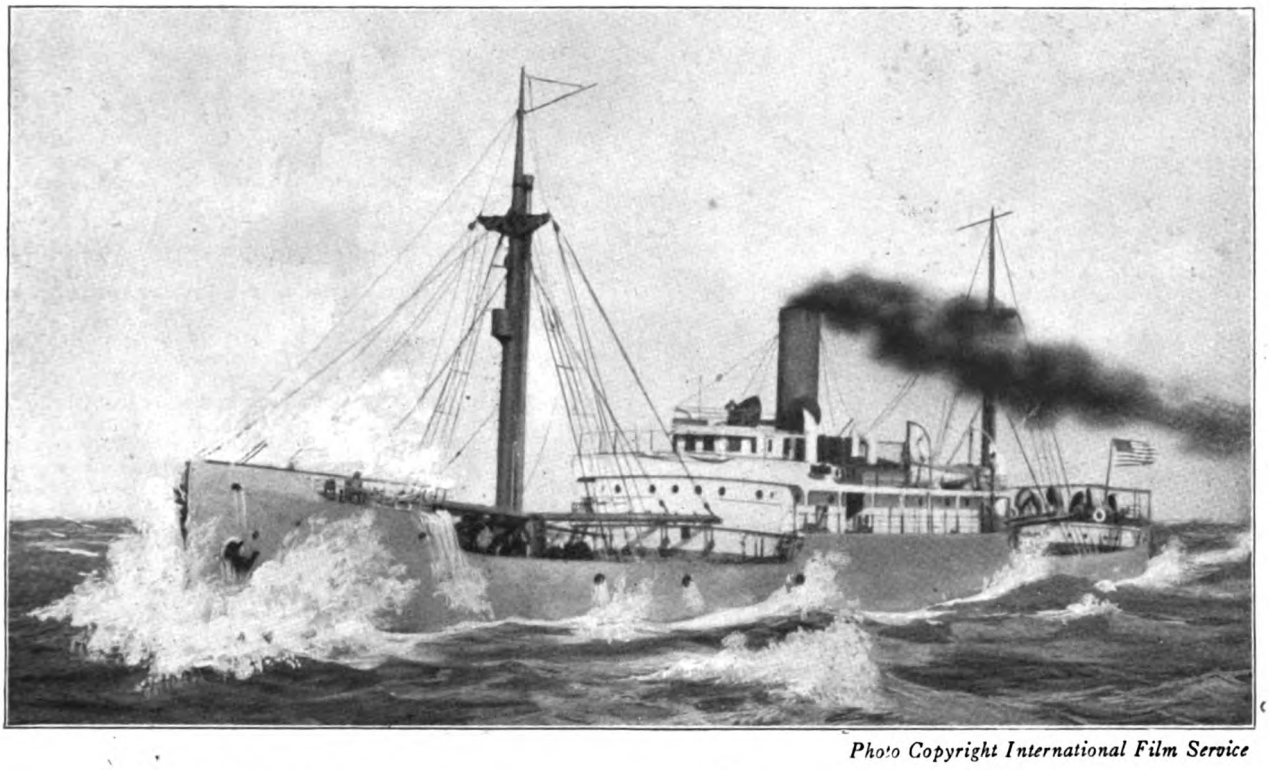

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TRADE PUBLICATIONS

Buffalo "Armor Plate" punches, shears and bar cutters are described in Catalogue P S,03, published by the Buffalo Forge Company, Buffalo, N. Y. According to this catalogue these Buffalo machines are seven and one-half times as strong as cast iron machines of equal capacity and less than one-half as heavy.

Du Pont "Fabrikoid" is described and illustrated in a circular issued by the Du Pont Fabrikoid Company, Wilmington, Del. "In order to conserve leather for the nation's vital needs, Uncle Sam has carefully investigated leather substitutes and made Craftsman Quality No. 1 the United States standard ship upholstery material. Fabrikoid will save immense quantities of leather on the ships of the Emergency Fleet Corporation. It costs less and wears better than leather for marine service, being absolutely mildew, mold and waterproof. Let us send you samples and quote prices."

"Speed Up Your Production" is the title of Catalogue 17-D, issued by the C. F. Pease Company, 230 Institute Place, Chicago, Ill. This bulletin describes and illustrates the Pease Peerless Automatic Blue Printing, Washing and Drawing Machine. "Equip your drafting room with the most approved type of drawing tables and filing cabinets. Our stock of filing cabinets is complete in both wood and steel, sectional and vertical. Of best material and workmanship. Send for Catalogue No. 17-D, which illustrates and describes our full line. The Pease Peerless Automatic Blue Printing, Washing and Drying Machine is used by every United States navy yard as well as by most shipbuilders and manufacturers. Most compact and efficient equipment made. Prints, washes and dries by one continuous operation. Requires but one operator. Turns out one hundred lineal yards of finished blue prints per hour, and occupies only 5 1/5 by 6 1/2 feet of floor space. Maintenance expense is practically eliminated and operating expense is less per square foot of finished prints than any other blue printing machine made."

The "Wonder" Pipe Bender is the subject of an illustrated circular published by the American Pipe Bending Machine Company, 35 Pearl street, Boston, Mass. "Here is a machine that bends all sizes of pipe generally used to any required degree easily, quickly, surely. It bends the pipe cold without treating or filling of any kind. It does not weaken the metal or open seams. Any boy laborer or helper can understand and operate it without possibility of mistake. It can be knocked down in a few minutes and moved from job to job. The entire weight with 2-inch head is about 400 pounds. With full complement of six heads, from ½ inch to 2 inches, the total weight is about 550 pounds. The Wonder Pipe Bender is so economical that the smallest shop may have one. The contractor will find a saving of workmen's time in having a machine for each job. The saving in time is very marked. Every pipe fitter knows that it takes quite awhile to cut, thread and fit an elbow joint. The Wonder Pipe Bender, operated by unskilled workmen, will bend a 2-inch pipe to a 90-degree angle in about a minute. Material is saved also. Engineers and architects recommend the smooth curves and bends given by the Wonder Pipe Bender. Not only is all possibility of leakage eliminated, but friction is lessened. The joints of an elbow section retard the flow of steam, water or gas, while a perfectly bent pipe offers no obstruction."

Imperial Flood Light Projectors and Imperial Reflectors are described in Bulletin No. 302, issued by the Crouse-Hinds Company, Syracuse, N. Y. "Flood lighting has become an established branch of illuminating engineering. It is now possible to meet the predetermined requirements for "bringing out" during darkness, with daytime clearness, the beauties of architecture and the commercial value of signs, as well as to illuminate large areas of land and water in the interests of business and pleasure and to permit the maintenance of an effective watch on property under guard. Imperial flood light projectors and reflectors embody all the scientific requirements for efficient flood lighting as outlind above. This bulletin describes, illustrates and lists the various types of Imperial flood light projectors and reflectors developed to date. * * * Crouse-Hinds reflectors meet lighting requirements in roundhouses, steel mills, prison corridors, on construction work, etc., and, in fact, wherever a stationary, strong and gas and moisture-proof illuminating unit is desired. There are two designs of these reflectors—types RM and RS. When mounted in a roundhouse or other building where corroding vapors circulate, they offer full protection against the damage to which exposed lights and wiring systems in such locations are subjected."

Foster Marine Superheaters are described in a bulletin just published by the Power Specialty Company, 111 Broadway, New York. "Foster superheaters are built to meet all conditions of marine work. They are designed for application to all types of boilers and for independent firing. The degree of superheat is governed entirely by the requirements of the individual ship, high superheat being desirable in some cases and prohibitive in others. The purpose of this bulletin is to describe one of the Foster marine superheaters—namely, the waste heat type, and place its advantages before marine engineers. The advantages obtained by superheating steam increase with the difficulties under which the steam is generated and used. The poorer the steam conditions the greater are the benefits and relief from superheat. Restrictions of space and the necessary accessibility for making quick repairs while at sea are marine conditions which for many years put insurmountable difficulties in the way of satisfactory superheater installations. Numerous superheaters have been tried, but until a few years ago none had proven satisfactory to marine engineers. The Foster waste heat type superheater has the following characteristics, which render it pre-eminently satisfactory for marine work: Maximum fuel and water economies at moderate temperature; convenient location, very accessible itself and leaves other equipment just as accessible as when no superheater is used; fool-proof and indestructible, due to Foster construction—may be by-passed without damage; moderate degree of superheat, requiring no lubrication; no special tools or equipment required; no change to boiler or tubes necessary; no hindrance to draft and no complication in boiler tubes."

Direction and Revolution Indicators are described in an illustrated 18-page catalogue issued by the McNab Company, Bridgeport, Conn. "Are you one of the few who has unintentionally neglected to give your captains and navigating officers vital information absolutely necessary in promoting the safe and efficient handling of your floating property? Your captain and engineer, although stationed apart on board ship, must work in harmony as one man in maneuvering your vessel out of dangerous quarters—one to give the orders by telegraph, the other to receive and promptly carry out the orders by engine movements. The slightest misunderstanding between the engine room and the bridge may mean the loss or the laying up of your ship at the dockyard for weeks; can you afford to take such chances these days? Think of the confidence your captain or pilot will have in the handling of your vessel in any narrow, congested or dangerous waterways if either of them are able to see by the eye that their telegraphic instructions to the engine room are being promptly and accurately carried out! Think of the insignificant cost of this renowned aid to navigation when it means so much towards the safety and prevention of damage to your vessel! The McNab direction indicators have become so well known throughout the world and endorsed by navigators under all flags as being of the greatest assistance in promoting safe navigation that further argument is foolish."

"The Pursuit of Safety" is the title of a handsomely printed and illustrated book of 40 pages which has just been published by the Automatic Sprinkler Company of America, 123 William street, New York. "Automatic sprinklers are the mechanical fire finding, fire announcing, fire extinguishing nerves of a building. The system of piping which carries water to every nook and corner, radiates over a structure as completely as the human nerve system does over your body. These nerves know only one thing about fire, and that is its heat. Their sensitiveness is concentrated in a wonderfully perfected valve called a sprinkler head. When fire starts the sprinkler head feels the sudden rise in temperature. The 'fuse-link' holding in place the valve seat of the sprinkler head is melted and down comes a deluge of pressure-driven water. Fire opens a sprinkler head by the same token that heat melts ice. Ice changes its form at about 32 degrees F. The sprinkler head 'fuse-link' melts at anywhere from 160 degrees to 360 degrees F., which we regulate according to the requirements. The opening of a single head throws out a protecting arm of water over approximately 100 square feet. With the heads so spaced that these guardian hands of water overlap, no part of your property is protected at the expense of another. Sprinklers do more than sprinkle. They are the sleepless, sensitive, ever dependable fire detectors, exterminators and alarms. First they detect the fire, then instantly begin extinguishing it, and simultaneously the alarm is sounded, is transmitted to the city fire department, to your own employees or wherever you wish. Not when the whole building is a mass of flames, but at the start of the fire. That is why sprinklers mean real safety from fire."

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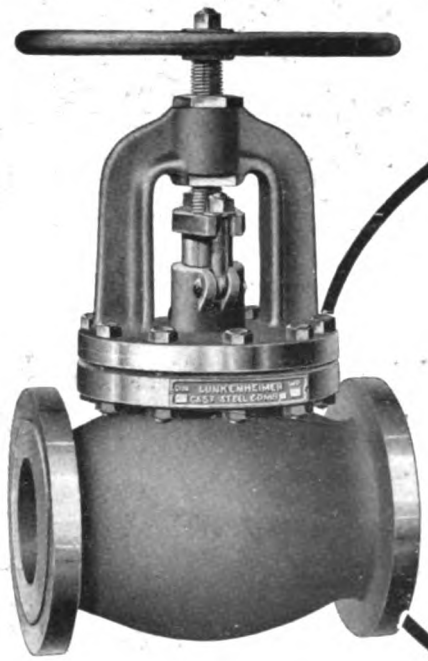

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Iron Body Pop Safety Valve.
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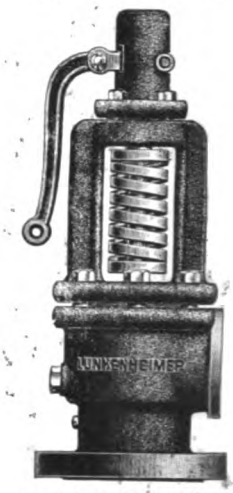
Full relieving capacity is a virtue in Lunkenheimer Pop Safety Valves. Their peculiar construction, incorporating an improved "pop" mechanism together with the large areas through the body, makes this a certainty.

They are economical because of their durability,—which means low maintenance cost. The high grade materials used vary for the different parts, being formulated especially for the duty each part performs. The workmanship is Lunkenheimer "Quality"—that high order which characterizes all Lunkenheimer Products.

Each valve is put through a rigid test under live steam before leaving the factory. It is set and the "pop" carefully adjusted to meet the service conditions for which the valve is intended.

Lock-key attachment is provided to guard against their being tampered with and provision is made for inserting inspector's seal.

Your local dealer can furnish them; if not, write us. Write for Booklet No. 502—BE which illustrates the complete line.



Iron Body Pop Safety Valve.
Exposed Spring.

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in the World

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BATH, MAINE

Manufacturers of

Windlasses, Steering Gears
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Bronze and Iron Propellers
8 in. to 20 ft. in diam.

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Air Furnace Refined Malleable Iron Clinch Rings, Self-colored or Hot Galvanized.

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PERFECTION (P) RIVETS
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NOVEMBER, 1917

INTERNATIONAL MARINE ENGINEERING

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CRANDALL
RAILWAY DRY DOCKS
MORE THAN 110 NOW IN USE

Greatest Efficiency With Least Expenditure

THE CRANDALL ENGINEERING CO.
EAST BOSTON, MASS.

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Eliminate power losses!

High efficiency in steam generation is a necessity. Of the many factors which contribute to boiler efficiency, a tight blow-off is a most important one,—a small leak at this point having a marked effect in increasing operating costs. The

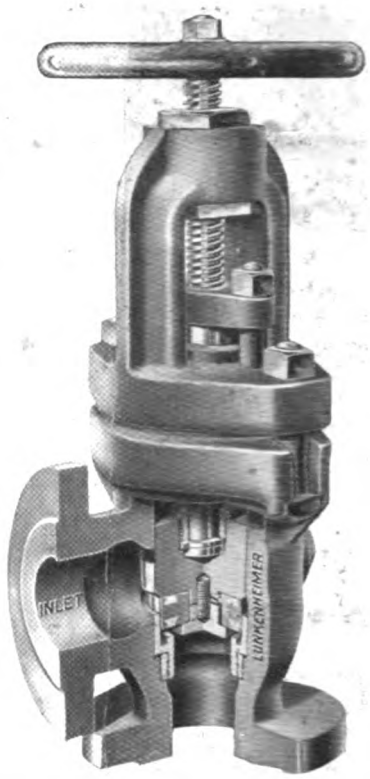
LUNKENHEIMER "DURO" BLOW-OFF VALVE

is the logical valve for this important service. It will remain tight under the most severe operating conditions.

The peculiar construction of the "Duro" **Seat-ring** and **Disc** provides self-cleansing seating surfaces. To further enhance its durability the Disc is reversible, and all parts including the Seat-ring and reversible Disc are renewable.

There is a size for every boiler; with material combinations to suit all pressures and service conditions.

Specify Lunkenheimer "Duro" and insist on its installation. Write for Booklet No. 515.—BE.



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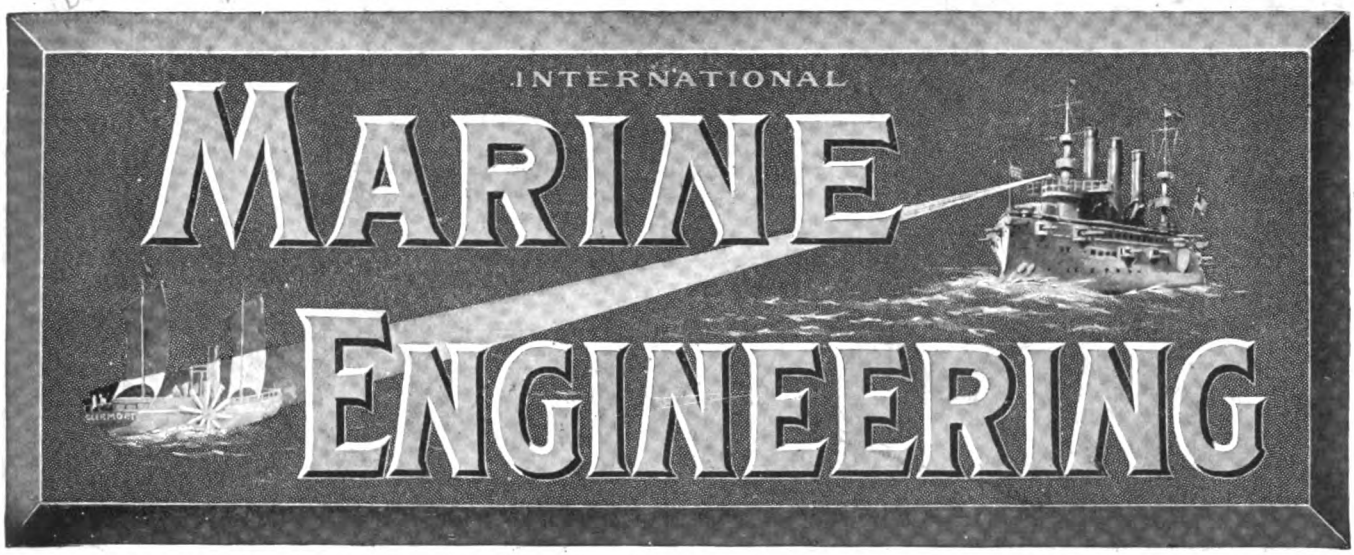
DECEMBER, 1917



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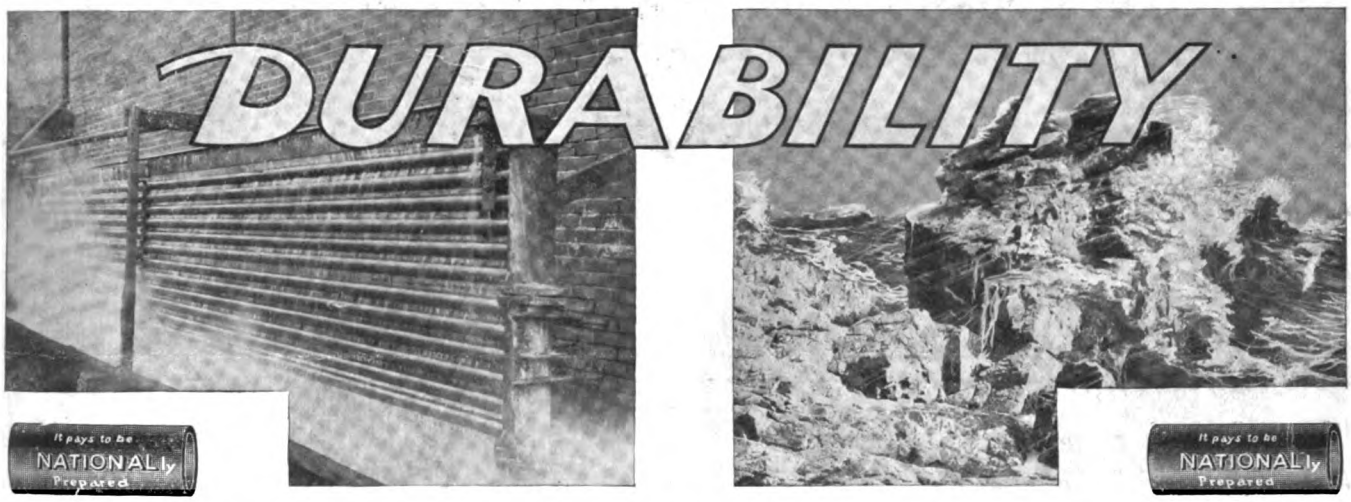

"NATIONAL" PIPE AND NATURE'S ROCKS BOTH EVIDENCE DURABILITY

Mr. N. C. Nicol, Met. Dept.,
National Tube Co.,
Pittsburgh, Pa.

Dear Sir:

In reply to your letter of the 3rd inst., I am sending you photograph of the atmospheric condenser which we have in operation here.

The condenser referred to was installed about five years ago; and is, as you are aware, made up entirely of "NATIONAL" pipe. It has been in operation constantly, night and day, under what I consider most severe corrosive conditions; as it is located on the roof, exposed to the weather with the cooling water constantly trickling over the entire outside of the pipe. During operation the cooling water is heated to a steaming temperature. I mention this, as it is a well known fact that water when heated to high temperature is much more corrosive than when cold.

The name "NATIONAL" which was rolled on each length of pipe, stands out as clearly today as when the pipe was new. From this fact, it is evident that the corrosion has been slight. Also we have not had trouble due to rust-scale forming on outside of pipe, and the only cleaning which we have done is to occasionally brush pipe on the outside with a broom.

As the pipe is subjected to both corrosive action on the outside, which I have mentioned, and also to the action of the condensed steam on the inside, and has withstood this test without any failures, I am glad to give you this letter for reference.

Yours very truly,

(Signed)————————(*)
Chief Engineer.

***Name and Address Supplied Interested Parties on Request**

This Installation is in Western New York

¶ Five years' steady service—365 days to the year—24 hours to the day—no rest—no let-up of any kind.

¶ SERVICE EVERY MINUTE.

¶ THAT was what "NATIONAL" Pipe was called on to do and at the end of five years, as mentioned in the chief engineer's letter, "The name 'NATIONAL' which was rolled on each length of pipe stands out as clearly today as when the pipe was new."

¶ Note also that the service was UNUSUALLY SEVERE.

¶ Again we say: "NATIONAL" Pipe and NATURE'S ROCKS both evidence durability.

¶ To readily identify "NATIONAL" material and as protection to manufacturer and consumer alike, the practice of National Tube Company is to roll in raised letters of good size on each few feet of every length of welded pipe (the name "NATIONAL (except on the smaller butt-weld sizes, on which this is not mechanically feasible), or the smaller butt-weld sizes the name "NATIONAL appears on the metal tag attached to each bundle or pipe).
¶ When writing specifications or ordering tubular goods al-
LOOK FOR THE MARK
NATIONAL
Name Rolled in Raised Letters on National Tube Company Pipe
ways specify "NATIONAL" pipe, and identify as indicated.
¶ In addition to all sizes of "NATIONAL" welded pipe heretofore and hereafter accepted for rolling, process for which was Spellerized, [illegible] tendency to [illegible] especially in the [illegible] pipe. This Spellerized pipe is peculiar to "NATIONAL" pipe, which process is the Company's exclusive rights.
¶ "NATIONAL" pipe was awarded the GRAND PRIZE (highest possible award) at Panama Pacific International Exposition, 1915.
AWARDED GRAND PRIZE
AWARDED GRAND PRIZE

NATIONAL TUBE COMPANY,

GENERAL SALES OFFICES: Frick Building, Pittsburgh, Pa.

DISTRICT SALES OFFICES:

Atlanta Boston Chicago Denver New Orleans New York Philadelphia Pittsburgh
St. Louis St. Paul Salt Lake City

Pacific Coast Representatives: U. S. STEEL PRODUCTS CO., San Francisco, Los Angeles, Portland, Seattle

Export Representatives: U. S. STEEL PRODUCTS CO., New York City.

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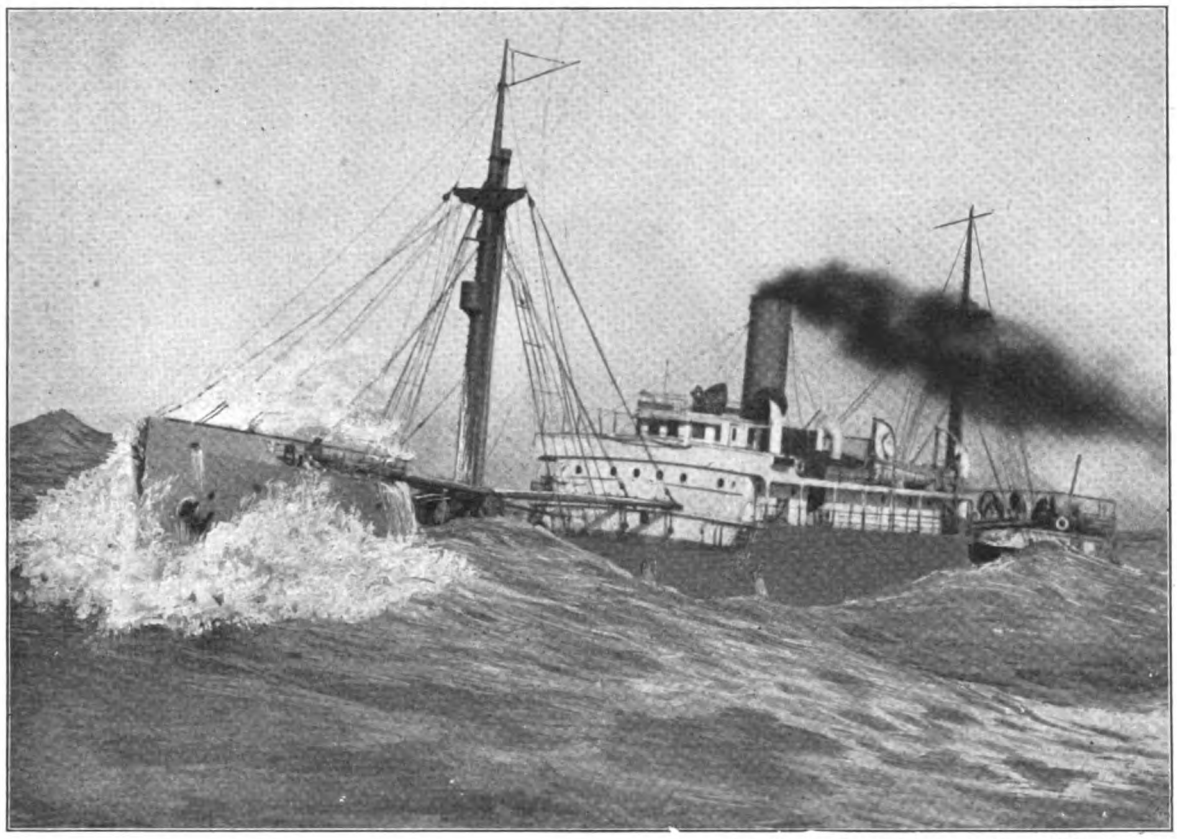

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"Colder than ever, and a head wind"

That's the time when the "Chief" has plenty to worry about.

But all his worries center on one point—*keeping up a good head of steam in the engine-room.*

Shoveling extra coal won't do it unless the pipes and boilers are properly protected against heat-losses.

"85% Magnesia" coverings on pipes and boilers insure a plentiful supply of steam regardless of weather conditions.

They save coal by preventing heat-losses. They deliver hot, dry, expansive steam to the engines. They make work easier in both stokehold and engine-room.

When repairs are needed, the "85% Magnesia" coverings are easily removed and replaced without damage—and with proper care will probably last as long as the pipes and boilers themselves.

For all these reasons, "85% Magnesia" covering should be specified for all new construction or renewals.

"85% MAGNESIA"

The Universal Covering for Pipes and Boilers

MAGNESIA ASSOCIATION OF AMERICA, 702 BULLETIN BLDG., PHILADELPHIA, PA.

(The member companies of this Association are contractors to the U. S. Army and Navy and to munition plants.)

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TRADE PUBLICATIONS

"Turning Waste Into Profit" is the title of a new book just issued by The Prest-O-Lite Company, Inc., 818 Speedway, Indianapolis, Ind. It is devoted exclusively to the possibilities of reclaiming broken and worn machinery and metal parts for service by the oxy-acetylene process, and is the most complete and comprehensive book ever issued on this subject. Containing eighty-two illustrations, it pictures and describes representative examples of reclamation welding work in practically every field of the industrial world. In the face of present high prices and scarcity of metal equipment, the subject of welding is receiving more than usual consideration, and this new book is truly a beacon to plant owners interested in the efficiency of holding down the "scrap heap." It is mailed to any interested executive upon request.

"How to Repair Broken Aluminum" by the Alumnite Process is described and illustrated in a circular published by the Alumnite Manufacturing Company, Inc., 427 Fourth avenue, New York. "Perfect results can only be obtained with Alumunite by following these directions: Cleaning: Thoroughly clean the edges of the metal which are to be soldered together. The best way to accomplish this is to first wash the surfaces with gasoline and rub them vigorously with a wire scratch brush. After the gasoline has thoroughly evaporated dress the edges down with a file, so as to get a perfectly clean, new surface. Again apply the gasoline and the scratch brush. The surfaces are now ready for "tinning." Tinning: The best way to tin the surfaces after the cleaning process, if the surfaces be large and of cast aluminum, is to apply the scratch brush vigorously and raise the temperature of the metal with a blow torch until the solder melts freely upon the edges to be joined and shows the tendency to adhere. While still applying the torch, continuously brush the solder into the joint until the joint shows a perfect plating or thin coating of the solder. Repairing: The work is now ready to be united. To do this, where it is convenient, lay the work upon a metal plate and place between it and the plate a piece of asbestos of about one-eighth inch fit. Bring the joints of the repair which are to be soldered against each other. Again apply the torch and melt some of the solder in a pasty form into the crack between the joints. Use an old hack saw blade, or similar thin piece of metal, to work the solder into the crack, and keep this process up until the entire crack is filled. The surrounding edges may be smoothed off while soft by 'wiping' or smoothing with the hack saw blade."

"Agrippa" Tool Holders are among the drop-forged machinists' tools described in a 28-page illustrated catalogue published by J. H. Williams & Company, 63 Richards street, Brooklyn, N. Y. "Unusual precaution has accompanied the development of this line of holders. Every detail has been tested and given closest possible attention. Materials best adapted to each of its parts have had every consideration and variety of test. The design, with the thought of its fullest utility and non-obstructive character, has had abundant and purposeful care. The holders or shanks, all drop-forged from a strong, tough grade of carefully selected steel, are submitted to a special heat treatment or refining process after forging, which develops resistance to all wear and the great strength necessary to overcome the pushing thrust imposed upon the cutters. The cutter-holding channel provides an unusually strong seat for cutter and great resisting qualities for the work imposed upon this portion of holder—a fundamental requirement in tool-holder efficiency. The 'Agrippa' cam fastening, which features the turning, cutting-off and side and threading-tool holders, is furnished from hardened and tempered crucible tool steel in either headless or hex head form. This simple and most efficient fastening largely eliminates the trouble and faults common to other holders. It is indestructible, provides for strength 25 to 50 percent greater than that of fastenings used similarly, and removes the repair and replacement necessities so common in other varieties of holders. The 'Agrippa' bar cutters, made from high-speed, etc., steels of selected grade, are all cut to the 'diamond point' form or bevel. They thus provide for the most common requirements with a minimum of grinding for either right or left-hand usage; also the full extent of economical service that distinguishes this superior line of tool holders. Special features of superiority and individuality applying to each holder are detailed on their respective tool pages immediately following."

Bulletin S-1, describing electric hoists, has just been published by the Shepard Electric Crane & Hoist Company, Montour Falls, N. Y. "The cost and scarcity of labor and the difficulty of keeping men at heavy lifting work, has developed an insistent demand for electric hoists for handling loads of ¼ ton, ½ ton and 1 ton. To meet this demand we have added three sturdy little hoists of these capacities to the Shepard line. They are helping progressive manufacturers to increase production, to reduce handling costs and to retain men in these jobs. Like the larger machines in the Shepard line these hoists have bath oiled gearing and brakes, enclosed within the frame. This design permits bath lubrication and excludes all dirt. The balanced drive insures permanent alignment. The prices quoted are for single speed control only. For prices on hoists equipped with variable speed control apply to the address on the first page. We are producing these hoists, with perfected tools, in such large quantities that even in these busy times shipment can usually be made from stock."

Snow Oil Pumps are described and illustrated in Bulletin S-112, just issued by the Worthington Pump & Machinery Corporation, 115 Broadway, New York. Among the other products of the Worthington Pump & Machinery Corporation are the following: Accumulators, air pumps, automatic feed pumps and receivers, ballast pumps, barometric condensers, beer meters, centrifugal pumps, central condensing systems, check valves, cooling towers, disc meters, dry vacuum pumps, elevator pumps, electric pumps, feed pumps, fire pumps, foot valves, fuel oil pumps, high-duty pumping engines, hot water meters, house tank pumps, jet condensers, low steam pressure pumps, mine pumps, oil line pumps, oil meters, piston meters, pressure pumps, self-cooling condensers, sinking pumps, steam turbine condensers, strainers, surface condensers, tank pumps, triple expansion pumping engines, turbine pumps, turbine water meters, underwriter fire pumps, vacuum pumps, volute pumps, water works pumping engines, water meters, wet vacuum pumps. Special catalogues will be furnished upon application

"The Cost Cutter" is the title of a bulletin published by the Brown Portable Conveying Machinery Company, Chicago, Ill. "The trend of the age is toward efficiency and economy and against wasteful and non-productive expenditure. The handling of your finished products—the trucking and piling of your sacks, cases, crates, bales, barrels, etc., is an expense that produces nothing—that merely adds to your cost without giving you an adequate return in either quality of goods or selling price. Inefficient methods in handling your products waste your money and reduce your profits. This problem of non-productive labor—an expensive, yet imperative evil—is solved, or simplified, by the Brown portable elevating, conveying and unloading machines—portable, sectional, adaptable, reliable, economic, efficient—machines that transform waste into profit. Let us get together on this matter, let us show how we can save you money, approximately how much we can save you, and what it will cost you—if we can't save money for you we will tell you so. We want to serve you; we want to provide for your individual needs; we are prepared to meet the efficiency requirements of your plant just as we have met those of others in all parts of the world. We have made profits for many industrial concerns, large and small, for railroads, steamer lines, municipalities and others, and believe we can do the same for you. It costs you nothing to investigate and does not obligate you in any way."

Landis Threading Machinery is described and illustrated in a 78-page catalogue just issued by the Landis Machine Company, Inc., Waynesboro, Pa. "In this catalogue we invite your attention to the Landis die and shall discuss its worth from a viewpoint of economy, production and efficiency. Accordingly, we submit for the reader's consideration those characteristics which substantiate our claims for longer life, increased output, low cost of upkeep and greater accuracy. The conception, as well as the development of the Landis die, was the natural outcome of the endless difficulties encountered with the hobbed type die. The fundamental principles to which its superiority is attributed depart widely from those of other designs. We have not only incorporated every feature contributive to economical production, but have eradicated the inherent defects and weaknesses of other types. Since the last isue of our catalogue we have perfected a line of pipe threading and cutting machines and have developed a grinder suitable for our chasers. This catalogue is devoted almost exclusively to a description of Landis bolt and screw cutting machinery. It also treats in a cursory manner of the Landis pipe and nipple machine and the Landis pipe threading and cutting machine. For detailed information concerning these machines and their accessories we are pleased to refer you to our Catalogue No. 23, which will be gladly sent upon request."

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Westinghouse Marine Equipment is the subject of a bulletin issued by the Westinghouse Electric & Manufacturing Company, East Pittsburg, Pa. One of the illustrations in this bulletin shows the engine room of the steamship *Hisco*. She is one of a large number of ships now under construction at the Chester Shipbuilding Company's yards, all of which are to be equipped with Westinghouse propelling machinery.

"Steel Pipe and Progress" is the title of a bulletin published by the National Tube Company, Pittsburg, Pa. We quote as follows, leaving out the illustrations:

The wonderful and rapid development of the steel pipe industry within recent years reads like a romance or a tale from the "Arabian Nights' Entertainments." It is indeed a romance—an industrial romance, in which the leading character—wrought pipe—has made possible the efficient development and expansion of hundreds of industries.

Often the term "wrought pipe" is mistaken by consumers and others to apply to wrought iron only, but this term is generic and applies to either wrought steel or wrought iron pipe. Its correct use in specifications and elsewhere means that either wrought steel or wrought iron pipe may be furnished.

Prior to 1888 all wrought pipe was made from wrought iron skelp, and to this may be attributed, no doubt, the occasional misinterpretation of the term. However, in that year experiments with soft mild steel for wrought pipe manufacture proved so successful that wrought steel pipe soon became widely used in place of the older wrought iron pipe. In fact, the consumer quickly discovered that the new soft steel pipe possessed the good qualities of the old wrought iron and in addition was superior in physical properties.

The production of wrought steel pipe grew by leaps and bounds, and soon became a most important factor in the wrought pipe industry. By 1905 the production reached such large proportions that the American Iron and Steel Institute considered it advisable to compile separate statistics showing the relative production of these two materials. In that year the tonnage of wrought steel pipe was more than twice as great as that of wrought iron, and since then it has been constantly increasing. The following table shows the tonnage production of steel and iron pipe skelp as compiled by the American Iron and Steel Institute and published in Special Statistical Bulletin No. 3 (1916):

PRODUCTION OF IRON AND STEEL SKELP IN THE UNITED STATES FROM 1905 TO 1915. GROSS TONS

Year	Iron	Steel	Total	Per Cent Iron	Per Cent Steel
1905.....	452,797	983,198	1,435,995	31.5	68.5
1906.....	391,517	1,137,068	1,528,585	25.7	74.3
1907.....	444,536	1,358,091	1,802,627	24.6	75.4
1908.....	297,049	853,534	1,150,583	25.8	74.2
1909.....	370,151	1,663,230	2,033,381	18.2	81.8
1910.....	350,578	1,477,616	1,828,194	19.2	80.8
1911.....	322,397	1,658,276	1,980,673	16.3	83.7
1912.....	327,012	2,119,804	2,446,816	13.3	86.7
1913.....	312,746	2,189,218	2,501,964	12.5	87.5
1914.....	264,340	1,718,091	1,982,431	13.3	86.7
1915.....	262,198	2,037,266	2,299,464	11.4	88.6

Here is concrete evidence of the wide use of steel pipe. Occasionally one hears the statement that wrought iron pipe is "coming back," but certainly in the light of the above statistics this is quickly disproved.

Analysis of these statistics shows:

(*a*) The production of wrought iron skelp (from which the pipe is made) during the year 1915 is the lowest production in any year on record.

(*b*) Not only is the actual production lower but the percentage of wrought iron to the total skelp produced is the lowest on record, this being 11.4 percent.

(*c*) While the tonnage of wrought iron skelp manufactured was the lowest on record the steel skelp produced during 1915 was only exceeded by the production for the years 1912 and 1913. In the production of wrought iron skelp, beginning with 1912, each year has shown a decline from the record of the previous year.

Certainly these authentic statistics show the general trend of the times. Steel pipe has invaded practically every industry where pipe is required. Steel pipe is now recognized, not only as standard for oil and gas fields, but for water works, power plants, irrigation systems, railway systems, building construction, manufactories and hundreds—yes, thousands—of other fields. The mechanical uses for both welded and seamless steel tubing are without number. One can hardly turn around without seeing evidence of this on every side.

In fact, the demand has been so great for steel pipe that one of the largest manufacturers of wrought steel pipe has recently begun the erection of a new mill at Gary, Ind., which

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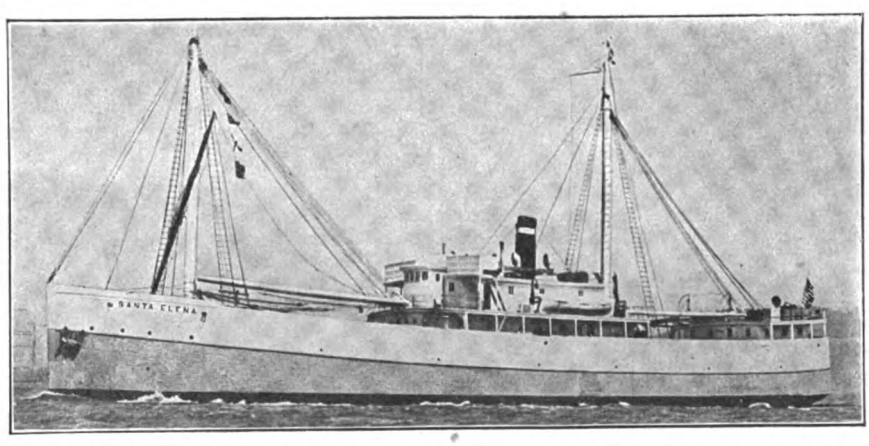
The Engine that is *NOT* a Diesel—The Engine that is *NOT* a Semi-Diesel—The Engine that is the Standard for Hot Bulb Engines

VESSELS NOW IN SERVICE OR BUILDING IN U. S. A. ALONE FITTED WITH BOLINDER ENGINES AGGREGATE 175,000 TONS D. W.



Motor ship "SANTA ELENA"—one of *five* owned by Messrs. W. R. Grace & Company of San Francisco, *each* fitted with 640 B. H. P. Bolinder.

BOLINDER'S COMPANY, 30 Church St., New York

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will have a capacity of over 500,000 tons annually—probably more than the greatest tonnage of wrought iron pipe ever made in any single year.

But why should steel pipe find such universal use?

Why should the consumer, the engineer, the architect, the purchasing agent and all others who use or specify pipe, specify steel pipe?

Because the modern well-made steel pipe is strong and very ductile. Steel pipe has a tensile strength of 58,000 pounds per square inch—an elastic limit of 36,000 pounds per square inch —22 percent elongation in 8 inches and 55 percent reduction in area.

Because, in ductility, modern steel pipe excels any material heretofore used in the manufacture of wrought pipe, on account of the constant uniformity of chemical and physical properties. Steel pipe is made by machinery in very large unit quantities, under the personal supervision of a few highly trained men, which makes possible the maintenance of this unvarying uniformity. As a concrete example of the absolute control of the chemical composition of modern pipe steel suffice it to say that the carbon content does not vary .01 percent in a year's work. The carbon content is so low (not more than .14 percent in "National" Pipe) that steel pipe will not take a temper when heated to redness and quenched in water, and will bend without fracture through 180 degrees before and after quenching.

Well-made steel pipe is easily threaded, and gives good, strong, clean-cut and durable threads, which make tight joints —a most essential factor in any pipe installation. The power required to thread steel pipe is approximately the same as required to thread genuine wrought iron pipe.

Soft, mild steel pipe is uniform in physical structure. There are no blisters or laminations to contend with, for steel pipe is made from skelp rolled from the solid billet and not from a number of plates piled together, heated and rolled into skelp. Steel pipe gives a good, strong weld, and this, together with the great physical strength of the material, makes steel pipe safe for any installation requiring the use of wrought pipe. Steel pipe is "safety first" and "safety always."

After years of experience, study of service conditions, manufacturing processes and extended research work, steel pipe manufacturers have been able to continually improve their product wherever improvement has been possible. For many years steel pipe has been equally as durable as wrought iron pipe. To-day in many instances, steel pipe has been proved to be more durable. Modern steel pipe contains less than .5 percent of impurities—is practically pure iron. And in pure iron maximum durability is obtained. There is approximately 99.5 percent pure iron in steel pipe.

The opinion at one time advanced in certain sections that wrought iron pipe was more durable than steel pipe has long since disappeared. Hundreds of service investigations, by practical engineers, contractors, industries and many disinterested authorities on iron and steel products, of steel and iron pipe installed upwards of fifteen or twenty years ago, have proved that there is little or no difference in the durability of the two products. Practically all the investigations have been made in the field where both classes of pipe have been installed in identical service. Often, unknown to the owner, there have been accidentally installed alternate lengths of steel and iron pipe, especially during that period when there was a free mixture of both classes of pipe in many installations. These mixed installations have been of inestimable value to the investigator, because all service conditions were then identical and comparative results of service became invaluable.

The now acknowledged fact that wrought steel and wrought iron pipe are equally durable, however, does not prove that poorly made steel pipe is equal to the best grades of wrought iron pipe, or vice versa, for there are many indifferent grades of both classes of pipe on the market. The largest manufacturer in America of steel pipe was at one time the largest manufacturer of wourght iron pipe; but after many years of investigation and research work finally abandoned the manufacture of wrought iron pipe in favor of the modern steel pipe, being convinced that well-made wrought steel pipe is not only equal in durability but superior in physical properties to the best grades of wrought iron pipe made.

Steel pipe is the recognized leader of all wrought tubular products. Why? Because steel pipe has been awarded the Grand Prize by the Superior Jury of Awards at the Panama-Pacific Exposition, San Francisco, 1915.

Steel pipe represents progress.

The development and progress of the wrought pipe industry since the introduction of steel pipe has been apace with that of other engineering fields. A few years ago we drove a "coach and four"—to-day we are hardly content with a high-powered motor car. Yesterday we heralded the carbon filament as a

200 VESSELS
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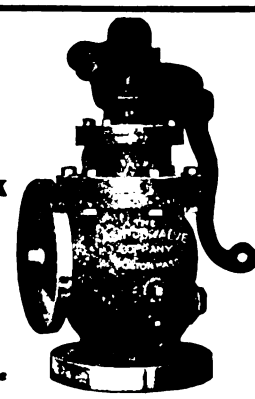
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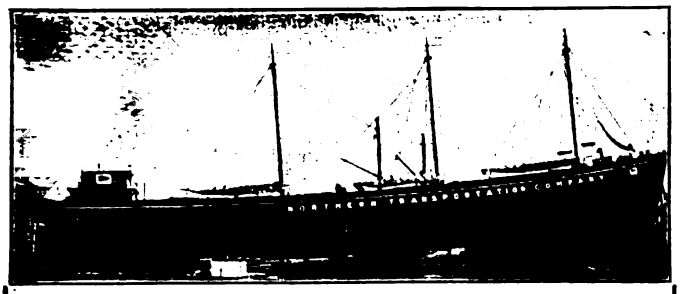

Barge built by Kelley, Spear & Co., Bath, Me. for the Northern Transportation Co. Hull above waterline painted with Dixon's Silica-Graphite Paint, black.

Paint economy is not the price paid but the number of years of service given. Longest protection against storms, salt air, and other deleterious conditions is given by

DIXON'S SILICA GRAPHITE PAINT

when used for all metal or wood work **not** under water.

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Our Paint Department is prepared to advise promptly reagrding your paint problems.

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ESTABLISHED 1827

brilliant substitute for the gas light—to-day we have far surpassed its brilliancy with the nitrogen lamp. For centuries man said it was impossible to build a flying machine that would fly—but this has long since been accomplished.

Many of us can remember that we were glad to ride on the horse cars, but can we really compare our modern high-speed interurban electric to this primitive mode of travel? Could the modern farmer reap his thousands of acres of wheat with the old-fashioned scythe? To-day gigantic reaping machines make harvests almost a play-time. We all were willing to sit in the "bald-headed" row at the theater and pay top-notch prices until the advent of the "movie," where we can now see the same play for a dime!

We were all willing to use wrought iron pipe until the more modern steel pipe had proved itself. But to-day it is steel first and always. And why? Because steel pipe represents progress. Man is not content to stand still. He must progress. And this is true: steel pipe has kept apace with the advancement and progress of the times. The steel pipe of to-day is the best wrought pipe that has ever been manufactured.

Drawing tables, filing cabinets, instruments of precision, planimeters, pantographs, slide rules and other similar instruments, are described by F. Weber & Company, 1125 Chestnut street, Philadelphia, Pa., in a catalogue recently published.

"To Win the War!" is the title of a circular published by the L. S. Starrett Company, Athol, Mass., calling attention to the important use of hack saws in shipyards. "Every minute wasted in an American shipyard prolongs the war. Every minute a mechanic uses a hack saw should be productive, not wasted. Hack saws are important—they can waste much time. Some cut slowly because of poor quality, or because not suited to the job; then there's time lost by breakage. But Starrett hack saws cut quicker; last longer, because made of tungsten steel, with teeth milled right and tempered right. Every shipyard should see to it that Starrett saws are used, for Starrett hack saws are unexcelled, just as Starrett tools are unexcelled. To get the utmost from hack saws choose a Starrett of the right number. Our catalogue tells what number to pick for given shapes or metals. If you're not using Starrett hack saws send at once for the Starrett Catalogue No. 21-L."

Powell Grease Cups are the subject of a vestpocket-sized booklet just issued by the William Powell Company, Cincinnati, Ohio. "Powell grease cups are specially designed for the purpose indicated and recommended by competent users everywhere. In the following pages of this booklet you will find illustrations and descriptions of a complete line of automatic grease cups. We feel assured the trade will find exactly what they require and can adapt for their particular use. All parts of our cups are made very strong and durable, finished in workmanlike manner, tested and inspected rigidly before leaving the factory. Engineers and mechanics no longer waste time arguing over the relative merits of grease and oil for lubricating purposes. Grease, after all, is only oil in another form, just as ice is only another form of water. Grease is oil at its best. Good grease used in Powell Grease cups has solved the waste problem in lubrication. These cups have paved the way to the highest economy and efficiency. One filling can be so regulated to last a long time."

Heavy-Duty Diesel Type Marine Engines are described by the McIntosh & Seymour Corporation, Auburn, N. Y., in a catalogue just published. "These marine engines are the result of eighteen years' stationary and marine Diesel engine experience and thirty years' experience in building the largest and highest class of steam engines. These engines are built in the largest and most completely equipped plant in this country, which is devoted exclusively to the building of Diesel type oil engines. Shipowners and shipbuilders should avail themselves of these facilities, because full Diesel type motor ships can carry more cargo for a given displacement than a steamship, as the space required for the Diesel type oil engine and fuel is much less than that required by steam engines, condensers, boilers and the necessary coal bunkers. On account of the extremely low fuel consumption (about one-third of a pound per indicated horsepower) much less fuel is required by a motor ship. The oil fuel, which can be handled through pipes by a pump, can be stored in parts of the ship that are inaccessible for coal, and can be much more easily handled. Because of the extremely small fuel consumption, fuel enough can be carried for extremely long voyages. The elimination of the boilers and the handling of coal make a small crew possible, saving the space they require and their maintenance. All the above gives motor ships greater earning power. Sizes available: 300, 500, 750, 1,200 and 1,350 brake-horsepower. All six-cylinder, all four-cycle, and all directly reversible."

Real WOLVERINE Power

The Motor With the Bore & Stroke

Fuel Cost Reduced

from 70 to 80% without sacrificing reliability, flexibility or control. Perfect combustion on Kerosene or lowest grade of Coast Distillate.

Sizes from 5 to 200 H. P.
1 to 6 Cylinders

Kerosene

The gasoline question has been solved by the

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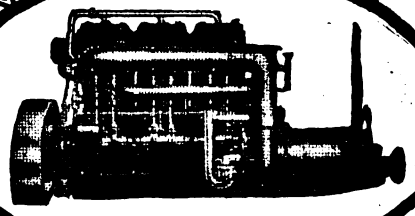

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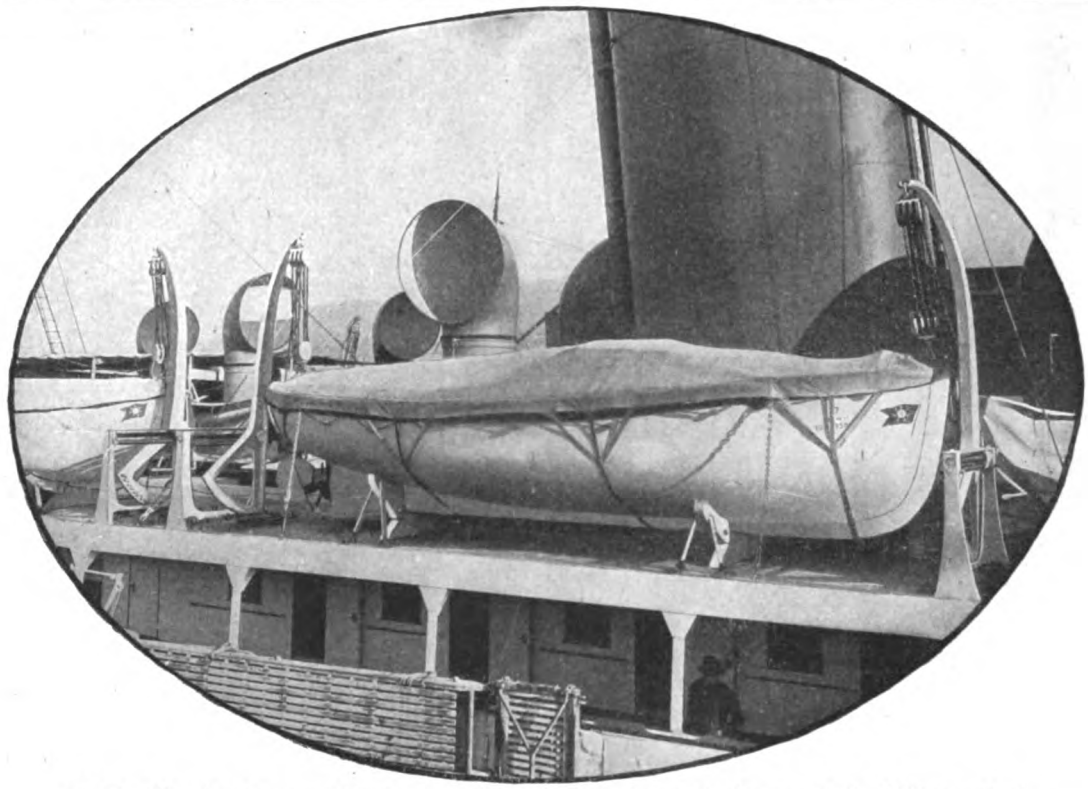
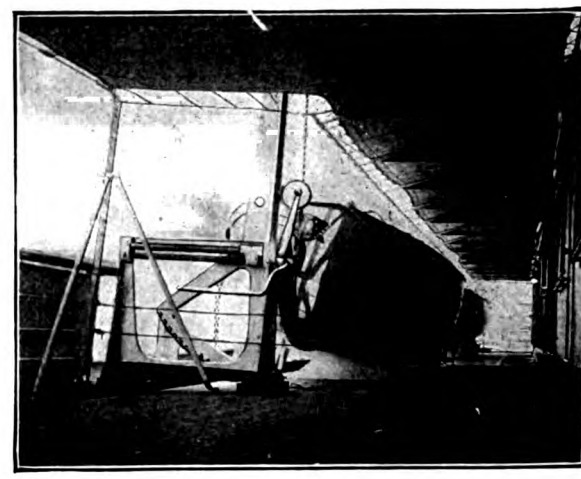


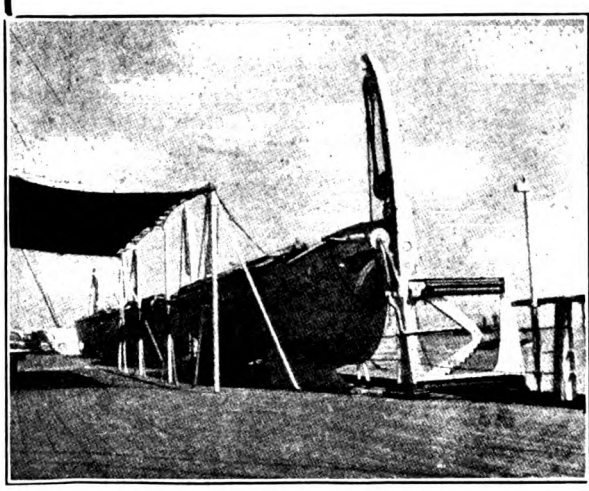
28 Ft. Wooden Power Life Boat and Welin Quadrant Davits on S. S. "Matsonia"
of the Matson Navigation Co.
ORDERS HAVE BEEN RECEIVED FOR EQUIPPING THE OTHER PASSENGER SHIPS OF THIS LINE.

This ship is equipped throughout with Welin Quadrant Davits and our Standard Steel Keel Metallic Lifeboats and a wooden power lifeboat.

This equipment covers the requirements in accordance with the provisions of the International Conference on Safety of Life at Sea and the latest U. S. Inspection.

It provides life boat capacity for all on board, and insures the greatest efficiency and security in time of need.





Some of the nine 28 Ft. Steel Keel
50-Person Standard Metallic Life
Boats on the "Matsonia"

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Thermometers of all kinds for home and general use.

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This instrument is especially fitted for plants where the atmospheric conditions necessitate the use of a case absolutely moisture, dust and fume proof.

Fully described in our catalogues which we will cheerfully send on request.

Taylor Instrument Companies
ROCHESTER, N. Y.

"Jeffery's Marine Glue vs. White Lead for Applying Canvas to Decks" is the title of one of the articles in the catalogue issued by L. W. Ferdinand & Company, 152 Kneeland street, Boston, Mass. "Marine glue is absolutely waterproof, and a deck painted with a heavy coat of hot glue must be waterproof even before the canvas is applied. The operation of laying the canvas in the glue by ironing it with a hot flat-iron draws a portion of the glue up into the pores of the canvas, filling and waterproofing it, so that no water can soak into it or the wood beneath. In the case of white lead it is neither waterproof nor a filler, it may shed water for a time, but not a very long time. As a filler the best you can hope to do is to work it into the face of the canvas, it does not permeate it as with glue. The worst feature about lead, however, is the fact that the oil or the combination of the oil and lead rots the canvas in a short time, whereas with Marine Glue the canvas is waterproofed and preserved, neither water nor oil can permeate it and it will last as long as the boat. We recommend Jeffery's No. 7 Marine Glue, or Special Canoe Glue, for applying canvas to decks, tops of cabins and for covering canvas boats and canoes."

Saws for Cutting Metal are described by the Simonds Manufacturing Company, Fitchburg, Mass., in a bulletin just published. This company makes metal saws for any kind, size or style of machine, slitters, screw slotters, hack saws and files; also every style and size of wood-cutting saws. The bulletin goes on to state, "These are a few of our dependable steel products. What do *you* need in steel products?"

Vulcan Soot Cleaners are described and illustrated in a 92-page catalogue issued by the Vulcan Soot Cleaner Company, Du Bois, Pa. "The growth in the size of boilers, the great increase in combustion rates and loads, and the demand for higher efficiencies of heat absorption, have all resulted in a closer scrutiny of the variables affecting heat transfer through boiler tubes. It has been found that when the combustion rate and load are doubled with a corresponding increase in the velocity of the gases, and when the boiler surface is maintained clean of coatings of soot and deposits of ash, two times as much heat is absorbed by each square foot of surface, and the temperature of the waste gases is little or no higher than that of the gases formerly discharged from boilers operated at low loads, with sluggish flow of gases and coated, insulated tube surface. Summed up, the modern practice in steam plant design is to drive boilers at higher rates per unit of surface, and to keep the heating surface working at high efficiency by maintaining it clean. The Vulcan soot cleaner is not to be confused with scale removal appliances for the water side of the surface, or with 'soot blowers.' The Vulcan cleaner is a complete, permanent, mechanical cleaning system, comprising standardized elements, which are arranged to form different designs according to the type of boiler and conditions to be met."

The I. O. C. System of "Bipolar" oxygen and hydrogen generating sets is described in an illustrated 24-page catalogue published by the International Oxygen Company, 115 Broadway, New York. "The industrial applications of oxygen and hydrogen—numerous and diverse and important as they are—have from the first been limited by the means available for the generation of these gases on a commercially economical scale. Though the advantages of these applications have long been known theoretically, their practical adoption in the mechanical arts has increased only as the means of gas generation have advanced toward higher commercial efficiency. In presenting its bipolar oxygen and hydrogen generator, this company feels that a forward step has been taken which will lead to even more general use of oxygen and hydrogen in the industrial world. And the new machine is recommended on these grounds to both present and prospective users of oxygen and hydrogen in quantities. This company was the first to introduce oxygen and hydrogen generating equipment in America on a commercial scale. And the soundness of its methods and the high quality of its product are attested by the fact that the I. O. C. unit or cell type generator is to-day generally recognized as the standard of efficiency and economy in the commercial production of oxygen and hydrogen. Without in any way disparaging or discrediting its unit type generator, the company offers its bipolar generators as a new and proved device, affording, for certain operating conditions, distinct advantages over the earlier model—which, by the way, will continue to be manufactured and improved to meet its special field. The I. O. C. bipolar generator is the result of several years' development of a method of electrolytic gas production embodied in a French patent. The type has passed through several progressive stages in the seeking for more perfect results. And in its present form the new generator is offered, not as an experiment, but as a tested apparatus that is mechanically, electrically, chemically and commercially right."

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COMPOSITIONS FOR IRON AND STEEL VESSELS' BOTTOMS
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Proprietors of INTERNATIONAL COMPOSITION, ANTICORROSIVE, and ANTIFOULING
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DIVING APPARATUS

The Coburn Overhead Carrying System is described in a profusely illustrated catalogue of 56 pages, published by the Coburn Trolley Track Manufacturing Company, Holyoke, Mass. "The great cost of any business is waste. Any waste is bad enough, but time is the greatest waste of all. It is impossible to calculate what lost time might have produced. Time is a ruling factor—competition is keen. Are you as well equipped to produce as your competitor, or does he slip in just ahead and win out? Are you aiding your production forces by adopting proven methods to minimize the labor involved in handling your products during the process of manufacture?"

For the Protection of Shipyards.—The importance of keeping out trespassers is recognized by shipbuilders and factory owners all over the country—and especially so under present conditions. The Anchor Post Iron Works, 25 Cortland street, South, New York, have published a bulletin describing their Anchor Post Fences. "Every American shipbuilder recognizes the vital importance of keeping trespassers off of his property. Not every shipbuilder, however, is aware of the almost absolute protection against thieves, tramps and even more dangerously malicious trespassers, that is provided by an unclimbable 'Anchor Post' chain link woven steel fence. These fences have been protecting factory properties all over the country for many years. We have yet to hear of a single one that has not afforded the high degree of security claimed for it. Made of heavy interlinking rods of No. 6 steel wire, and supported by high-carbon steel U-bar posts of generous section and weight, Anchor Post factory fences have such a long period of life that the first fence of this type (erected over ten years ago) is still in as serviceable condition as the day it was put up. Anchor Post fences have been approved and adopted by the engineers of the United States Navy and War Departments, and are used by hundreds of industrial corporations for the protection of their workmen and their plants. Our catalogue and the service of our engineers are at your immediate command. A line from you will bring prompt action.

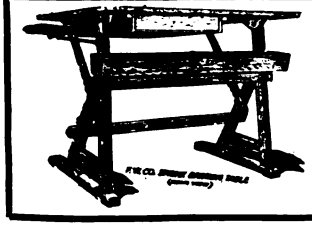
The Turner Baffle Wall is the subject of a circular published by The Engineering Company, 17 Battery Place, New York. "Leaky boiler baffles need not be a necessary evil, and you do not have to stand the loss that comes from missing tile or burned flame plates. The Turner baffle wall is built tight and stays tight. It is structurally correct. Firebrick are laid through the tubes to form diagonal shelves, and the pockets between the tubes and the brick are completely filled with a fire-resisting cement in a plastic condition. This construction gives a wall that will resist the intense heat of modern boiler room practice and provides for the easy renewal of tubes without injury. The replacement of destroyed flame plates is unnecessary, and the wall can be built at any angle to give the best form of tapered pass when bridge walls are moved back of the stokers or the settings remodeled. Turner walls built four years ago are still sound and tight. We contract for baffles in place."

BUSINESS NOTES

THE MCINTOSH & SEYMOUR CORPORATION, Auburn N. Y., announces that on account of the present unusual demand for marine equipment, it has transferred Mr. C. G. Cox, the company's present Central District manager, to the Pacific Coast, and has temporarily closed the St. Louis office. Mr. Cox will make his headquarters in San Francisco and Portland.

BOILER MANUFACTURERS' WAR SERVICE COMMITTEE.—Conforming to resolution adopted at the meeting of manufacturers with the National Chamber of Commerce, requesting all lines of business to appoint a war service committee to act as "point of contact" between said industry and the United States Government during the period of the war, the American Boiler Manufacturers' Association has appointed their committee as follows: George W .Bach, manager, Union Iron Works, Erie, Pa.; G. S. Barnum, president, Bigelow Company, New Haven, Conn.; W. C. Connelly, president, The D. Connelly Boiler Company, Cleveland, Ohio, chairman. Any one having business pertaining to boilers should address the chairman at once.

MEN WANTED FOR CIVILIAN EMPLOYMENTS IN THE ARMY.—The Quartermaster Enlisted Reserve Corps, with recruiting headquarters at 357 Broadway, New York City, have received a new authorization to enlist men to follow their civilian occupations in the army for duty in this country and abroad. The men particularly needed at this time are electricians, tinsmiths, iron workers, carpenters, plumbers, mechanics (auto.), mechanics (general), masons, bricklayers, farriers, horseshoers, saddlers, blacksmiths, teamsters, cooks, chauffeurs, stenographers, wagonmasters. Enlistment is open to citizens of the United States, or to those men who have declared their intentions of becoming citizens. They must be between the ages of 18-45 years, and have no one depending on them for support. Men who can qualify for the above positions will be examined physically at recruiting headquarters, 357 Broadway. New York City, and immediately sworn into service, and will be given a week or more time in which to arrange their private affairs before being called for active service. The enlistment in the Quartermaster Corps is for qualified men, and military training as a soldier is not required in this branch of the service. They do not have to drill with rifles, perform guard duty or other purely military duties which fall to the lot of soldiers of the infantry, cavalry and other branches of the army, except in cases of emergency. You can be enlisted up to the time your notice to appear for physical examination is posted by your local board. Applicants will be received at the Quartermaster Corps recruiting station at 357 Broadway,



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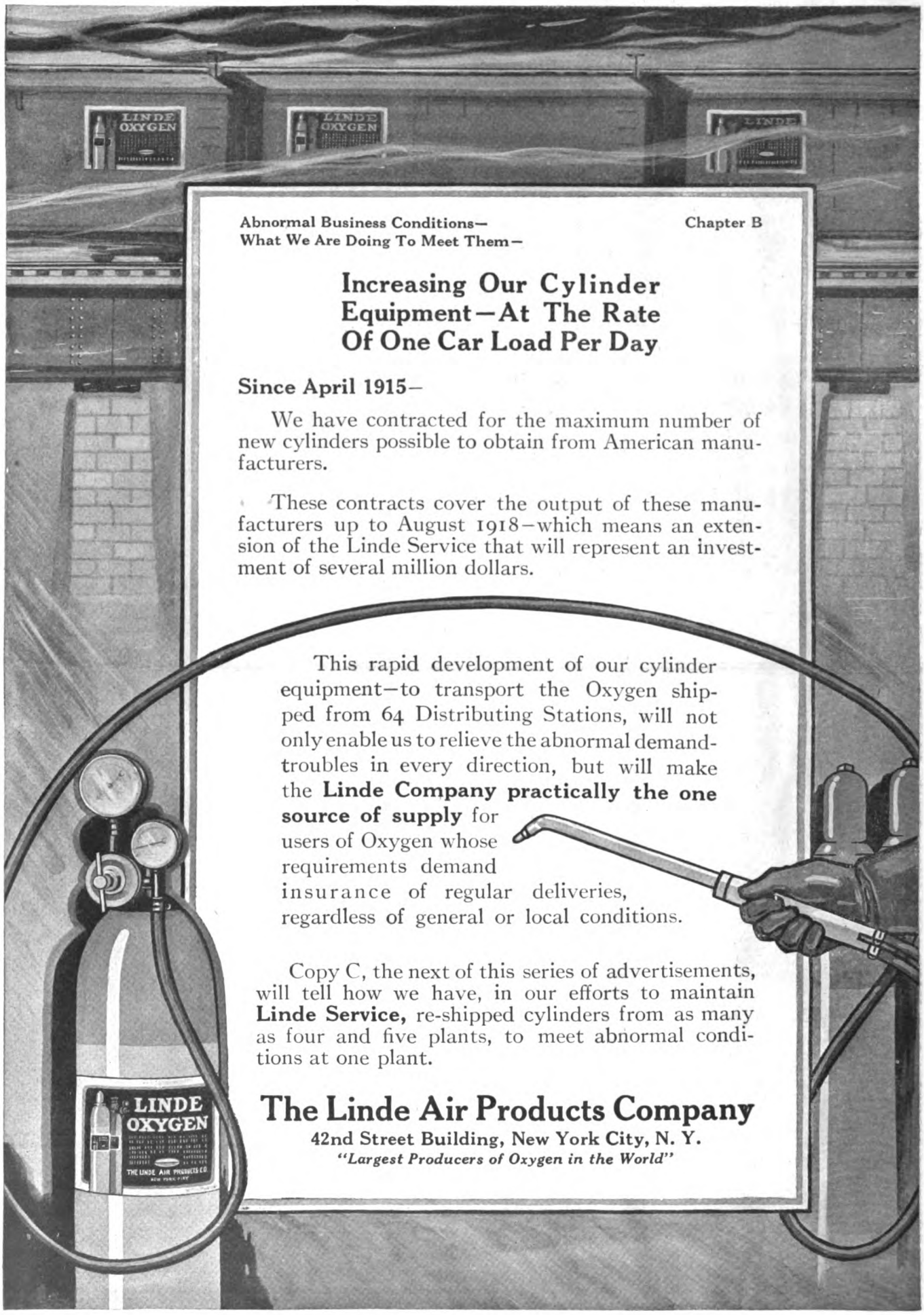

Abnormal Business Conditions—
What We Are Doing To Meet Them—

Chapter B

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Since April 1915—

We have contracted for the maximum number of new cylinders possible to obtain from American manufacturers.

These contracts cover the output of these manufacturers up to August 1918—which means an extension of the Linde Service that will represent an investment of several million dollars.

This rapid development of our cylinder equipment—to transport the Oxygen shipped from 64 Distributing Stations, will not only enable us to relieve the abnormal demand-troubles in every direction, but will make the **Linde Company practically the one source of supply** for users of Oxygen whose requirements demand insurance of regular deliveries, regardless of general or local conditions.

Copy C, the next of this series of advertisements, will tell how we have, in our efforts to maintain **Linde Service,** re-shipped cylinders from as many as four and five plants, to meet abnormal conditions at one plant.

The Linde Air Products Company

42nd Street Building, New York City, N. Y.

"Largest Producers of Oxygen in the World"

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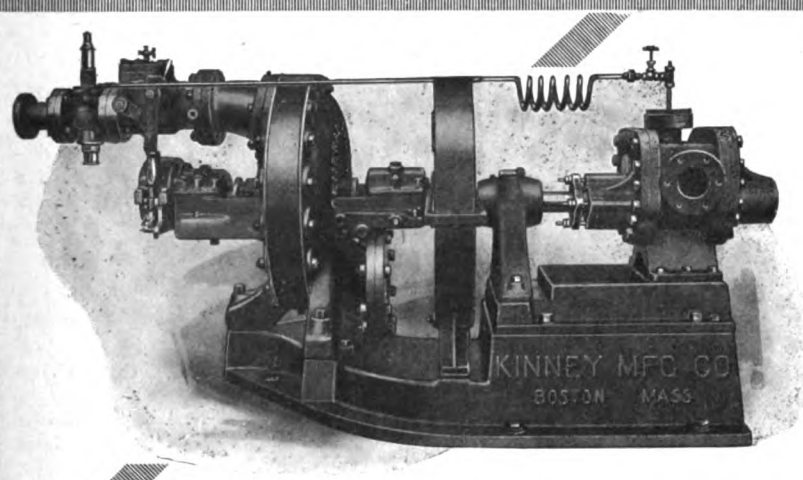
HOW DO YOU FIGURE?—Do you divide the years of service into the cost of paint, plus the cost of labor? If so, you have the correct method of figuring the yearly cost of paint protection. If you have metal surfaces or any exposed surfaces, whether of metal or wood, to repaint, it will be worth your while to purchase Dixon's Silica-Graphite Paint, because the longer service and better quality of Dixon's paint are worth a great deal more than a few cents per gallon. The careful and cautious user of paint will appreciate this fact. For over fifty years the slogan and standard of the Dixon Company in the matter of paint has been "the best and one grade only." If any one is looking for a low-priced paint and does not care about quality and long service, the Dixon Company has nothing for him; but if he desires quality and long service Dixon's Silica-Graphite Paint is the best for him. We are ready at all times to give detailed information, price and assistance in any way. Please write the Joseph Dixon Crucible Company, Jersey City, N. J., and watch Dixon's house organ, *Graphite*, for long service records.

"THE PROGRESS OF THE SCREW PROPELLER."—Raymond E. Lovekin, managing director of the American Screw Propeller Company, Hale building, Philadelphia, Pa., writes MARINE ENGINEERING as follows: Ever since the early days when the naked hand of man was used as a paddle for the purpose of propelling a ship, there have been numerous experiments made in connection with securing the most efficient means to impart motion to a vessel. Probably the first rotary motion applied for this purpose was in the year 1472 or thereabouts, when numerous paddle-wheels were fitted along each side of a ship and rotated by man power from cranks connecting in the middle of the vessel. Numerous other experiments were made by inventors during the 15th and 16th centuries in connection with various types and shapes of paddle-wheels, also hydraulic propulsion, although experiments upon the latter never proved of any real value. In 1793 a paddle-boat operated by a steam engine was actually run from Manchester to Runcorn, but the speed obtained resulted in the abandonment of this vessel for the time, and it was nine years later that a stern paddle-boat actuated by a steam engine was quite successfully run in England. In 1807 Robert Fulton, of New York, U. S. A., produced the *Clermont*, which was a side-wheeler operated by a steam engine. This vessel proved quite successful and led Mr. Fulton to build several more quite efficient ships of practically the same type. From 1807 to 1875 many more or less successful attempts were made to utilize a screw propeller as a means of propulsion, special credit during this period of time being given to the following gentlemen: Willliam Church, John Millington, Jacob Perkins, Bennet Woodcroft, Samuel Brown, John Ericsson, Joseph Maudslay, Robert Griffiths, Sir John Thornycroft and Mr. Yarrow. It might also be interesting to note that during this time, in the year 1845, the first screw steamer, *Great Britain*, crossed the Atlantic. The development of the screw propeller from 1875 to the present date has been marvelous, so that to-day practically all self-propelled vessels (excepting some ferryboats and river steamers) are put in motion by means of a screw propeller. This fact is due to the numerous experiments made upon the resistances of hulls and the adoption of a model tank, also through investigations into the elements of screw propellers and their design. Probably the most credit during this time is due to the following gentlemen, whose untiring efforts and remarkable foresight has enabled them to be recognized the world over as experts; to these men is due the high credit which they so richly deserve: Professor Rankine, Mr. Sidney Barnaby, Mr. A. E. Seaton, Mr. Peabody, Mr. R. E. Froude, Rear Admiral David W. Taylor and Capt. C. W. Dyson. The latter two gentlemen, of whom the United States may well be proud, are undoubtedly recognized as the most modern authorities to-day in their professions; Admiral Taylor for his work in connection with the resistances of hulls and investigations of propulsive problems, and Capt. Dyson for his work in connection with the estimation of power for the propulsion of vessels and the standard method of propeller designing which he has evolved.

INDUSTRIAL UNREST, particularly apparent throughout the country at present, has long been intensively studied by executives and Government officials. The universal verdict seems to be that employees, as a whole, feel that the ideas of scientific management have been wholly wrong, and that far greater consideration must be given the human element. Increased wage scales and shorter working hours, which was hoped would solve the problem, have utterly failed; various welfare movements, formed to remove the cause of and waylay discord, have been only partially successful; private associations establishing systems of furnishing information



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of more or less accuracy to employers for their use in eliminating misunderstandings, have failed because of the lack of knowledge and inexperience of operators. Certain detective agencies have established systems of "strike breaking," employing men in the place of strikers to keep plants in operation. Naturally these men have usually been inefficient and often strong-arm methods were used, resulting in bloodshed and further misunderstandings. This method is impractical, expensive and costs industry millions of dollars a year. About ten years ago, John F. Sherman, after making a life study of industrial conditions, founded an institution to put into practice his own methods obtained through practical experience. He made industrial conciliation an exact science. The basic principle of "Sherman Service," which has served hundreds of leading corporations, is harmony. In reply to many requests. Mr. Sherman has had prepared an 80-page book explaining the successful methods which he employs in eliminating discord and promoting harmony between employer and employee. It contains many features valuable to executives at this time. The main offices of the "Sherman Service," at 20 Broad street, New York; 208 South La Salle street, Chicago, Ill.; 10 State street, Boston, and 42 Church street, New Haven, Conn., are sending out this book to executives only who request it on their corporation's letterhead.

MARINE REFRIGERATION.—Some of the sales made by the Brunswick Refrigerating Company for steamship work since the last report in this paper are as follows: Sun Shipbuilding Company, 2-ton plants for Hulls 17, 18, 19, 20. With this order the company now has orders for plants on ships from 1 to 20, inclusive. Hull 1, the *Chester Sun,* was recently launched.

Pacific American Fisheries, eight 1-ton plants for ships building by them. This is in addition to orders previously reported as sold to this company.

Bethlehem Steel Company, Maryland Shipbuilding Plant, a 1-ton plant for their Hull 176.

Clyde Steamship Company, 1-ton refrigerating plant for the S. S. *Sioux.* Refrigerator of two compartments is cooled, and drinking water cooled in a scuttle butt is circulated to several points in the ship.

Baltimore Dry Docks & Ship Building Co., 1-ton plants for their Hulls 83, 84, 88, 89, 91, 92.

Kerr Navigation Company, 2-ton plant for the S. S. *Kermanshah.*

Staten Island Shipbuilding Company, a 1-ton plant for their Hull 689.

Standard Shipbuilding Company, 1-ton plant for the S. S. *Scandinavic.*

U. S. Shipping Board in New York, 2-ton plant for the S. S. *Nassovia,* a 4-ton plant for the S. S. *Prinz Osker,* a 4-ton plant for the *Arcadia,* and a 4-ton plant for the *Rhaetia.*

Newport News Shipbuilding & Dry Dock Company, 2-ton plants for the S. S. *El Oriente* and the *El Sol.*

Manitowoc Shipbulding Company, a 1-ton plant for Hull 81.

Kerr Navigation Company, 2-ton plant for the S. S. *Kerrwood.*

F. B. Lindemann, a 1-ton plant for the S. S. *Rosalie Mahoney.*

R. L. Smith, Inc., 2-ton plant for the S. S. *Armenia,* replacing a machine of another make.

Capt. J. R. De Lamar, a ½-ton plant for the steam yacht *Savarona.*

Standard Oil Company of New Jersey, 2-ton plant for the S. S. *Standard.*

Newport News Shipbuilding & Dry Dock Company, 1-ton plants for the S. S. *Mariana* and the *Edward Peirce.* These are additional plants put aboard these ships on account of increasing the size of the refrigerator.

Clyde Steamship Company, a 1-ton plant for the S. S. *Choctow.*

James Shewan & Sons, a 2-ton plant for the S. S. *Westvego.*

To the Captain of S. S. *Freshwater,* a 1-ton plant.

To the Government, a 2-ton plant, making a duplicate unit on the S. S. *Orion.*

To the Kensington Shipyard, a 1-ton plant for the S. S. *Mundale.*

U. S. States Shipping Board in New York, a 1-ton plant, making a duplicate unit on board the S. S. *Scandinavic,* due to increasing the size of refrigerators.

The Brunswick Refrigerating Company report that they have machines in stock at all times and can make prompt shipment and installation; in fact, installations complete have been made in less than 60 hours from the time the order was given. Their marine booklet, "Dividends from Waste," and Bulletin No. 101, describing the machinery, will be sent gladly to any one interested applying to their Marine Department, at New Brunswick, N. J.

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to represent some first-class engineering concerns on the Atlantic Coast, by trained and experienced engineer of high standing.

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Old established boiler plant, with national reputation, modern equipment for construction of largest sizes, marine boilers; in active operation; profits in present contracts will pay for plant, will inventory fifty percent on sale price. Desire to retire reason for sale. Full opportunity for investigation to inquirers with satisfactory references. Cash only.

Address Box 1000, care of MARINE ENGINEERING.

FOR SALE

Two (2) Southwark-Harris Valveless Oil Engines (Diesel Principle) 250 B.H.P., each, 200 R.P.M., Normal Speed, complete with wheels and accessories as listed and described hereinafter but without reversing attachment.

These engines are of the reversing Marine type and the reversing attachment can be supplied and attached by the Southwark Foundry & Machine Company at a reasonable cost.

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One (1) 5" x 5" American Blower Co. Vertical, self-oiling steam eng ne.

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Two (2) 70 gallon fuel oil service tank.

One (1) Marsh pump, 4" steam end, 2¾" water end, 3" stroke.

One (1) Marsh pump, 4" steam end, 3" water end, 4" stroke.

One (1) Marsh pump, 3" steam end, 2½" water end, 6½" stroke.

One (1) H.P. Winslow Flash Type Boiler, (W.N. Best, New York City).

Two (2) 10,000 Gallon Storage Tanks.

All connection and necessary exhaust piping and all interconnecting piping and valves between engines, bottles, service tanks, lubricating system and compressor.

The approximate weights of each engine are 80,000 lbs.

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Advertisements will be inserted under this heading at the rate of 4 cents per word for the first insertion. For each subsequent consecutive insertion the charge will be 1 cent per word. But no advertisement will be inserted for less than 75 cents. Replies can be sent to our care if desired, and they will be forwarded without additional charge.

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Draftsman Seeks Position.—Educated in the best schools of Europe, in architecture, and has had many years of experience in the highest grade of drafting work. Address *Drafting Work,* care of MARINE ENGINEERING.

Experienced engineer offers his services for the designing and supervision of shipyard construction ways, sheds, shops, crane supports and wharves. Address *Shipyard Construction,* care of MARINE ENGINEERING.

Turbine Engineer, graduate of Massachusetts Institute of Technology, with six years' executive experience in large Eastern manufacturing concern, in the development, design and testing of steam turbines, desires position as engineer in charge of turbine work in shipbuilding plant. Address *Turbine,* care of MARINE ENGINEERING.

Wanted—Supervisory position in shipbuilding plant. Twelve years' machine shop experience and twelve years' naval engineering service with reciprocating and turbine engines. Marked executive ability. References furnished. Address *Experienced,* care of MARINE ENGINEERING.

Wanted for the tropics, an experienced marine foreman for a large ship yard operating its own drydock. The applicant must be a man of experience capable of estimating repair and construction work and also handling said repairs. A Knowledge of Spanish is necessary. Address *Marine Foreman,* care of MARINE ENGINEERING.

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Executive Mechanical Engineer, 41, American, 20 years' practical experience as designer, chief engineer, general manager and consulting engineer, thoroughly conversant with all details of shipbuilding and shipyard construction for medium-size steel and wooden steamers; machine and foundry business, steam engines, boilers and auxiliaries. drydocking and repairs, desires change, preferably with new company, on government contracts, ships, engines or special machinery. Address *Executive,* care of MARINE ENGINEERING.

Experienced man desires position as manager of a saw mill, superintendent of construction work or superintendent of floating equipment. Any of these positions to be in connection with a shipyard logging its own mill by water or operating its own saw mill. Has made a specialty of superintending inland transportation in bulk, and has also had experience in building and maintaining Western river boats; as a manager of a saw mill, and as a steamboat pilot. Address *Construction Work,* care of MARINE ENGINEERING

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NATIONAL ASSOCIATION OF ENGINE AND BOAT MANUFACTURERS
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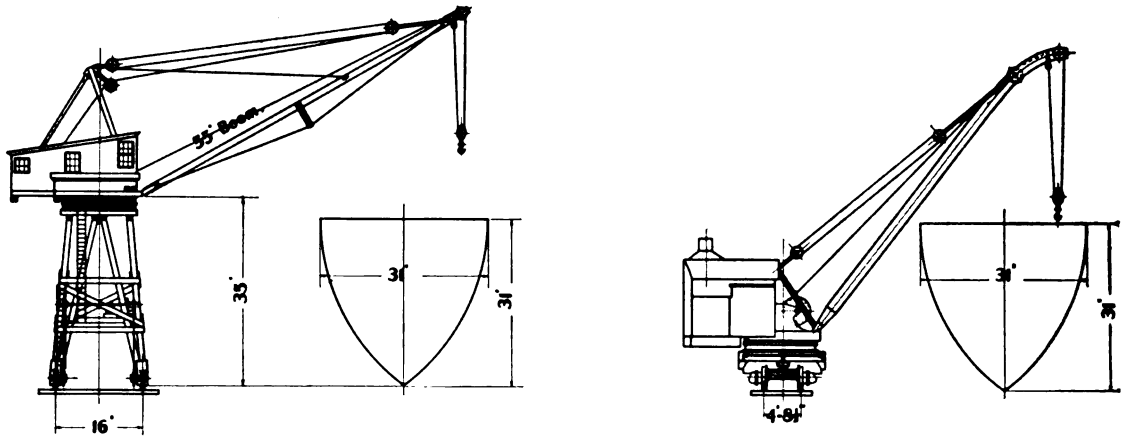

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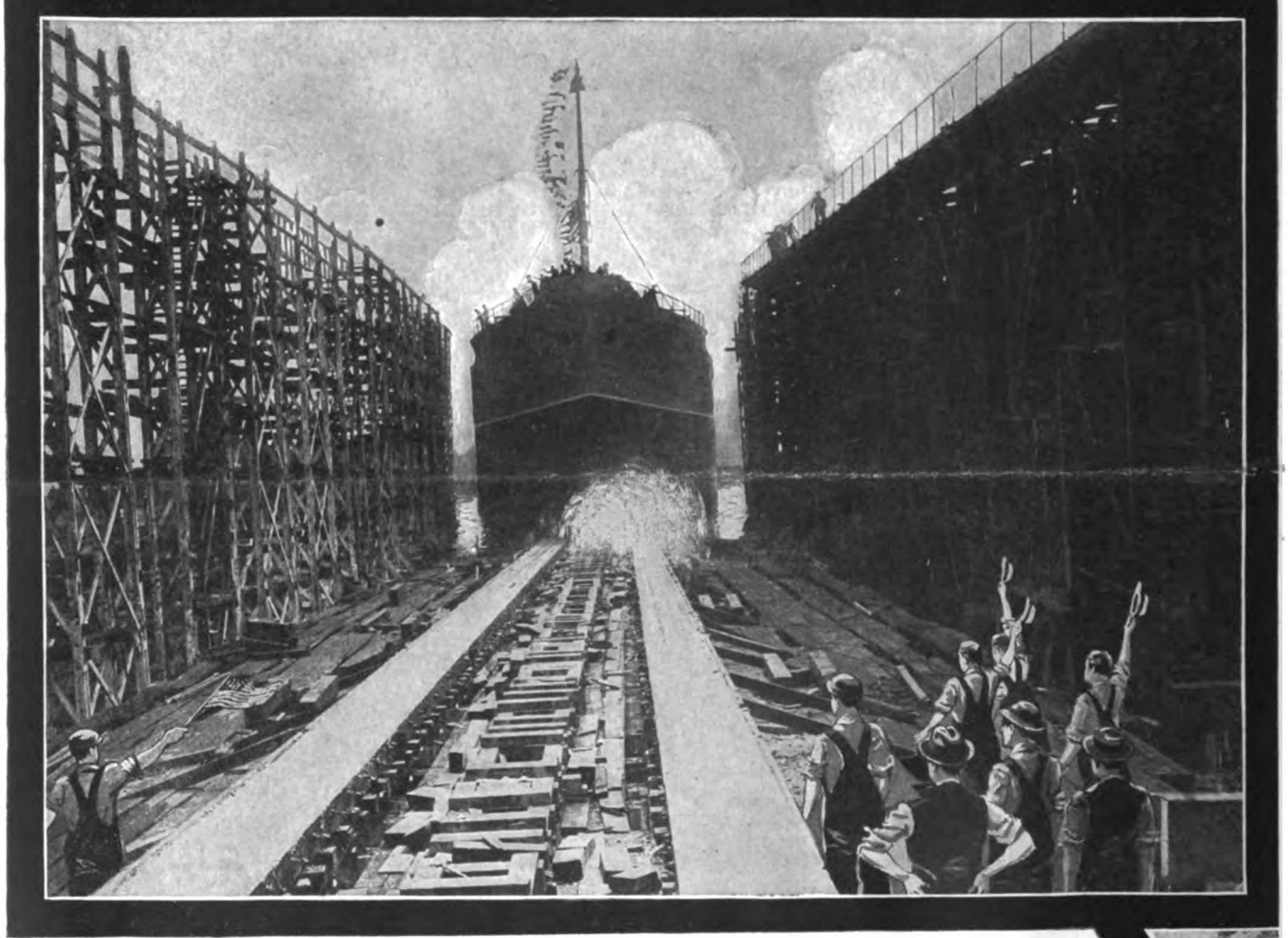

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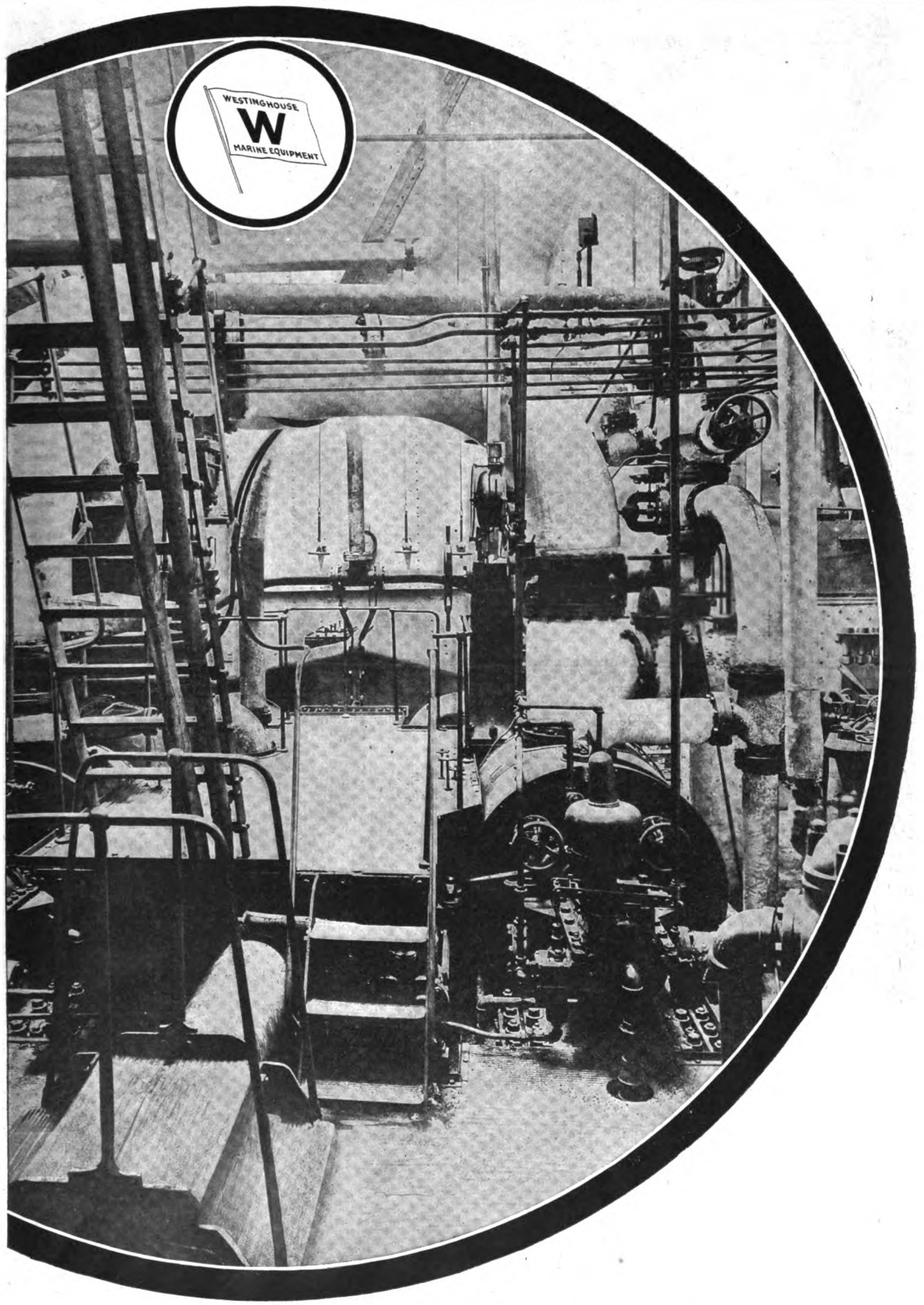

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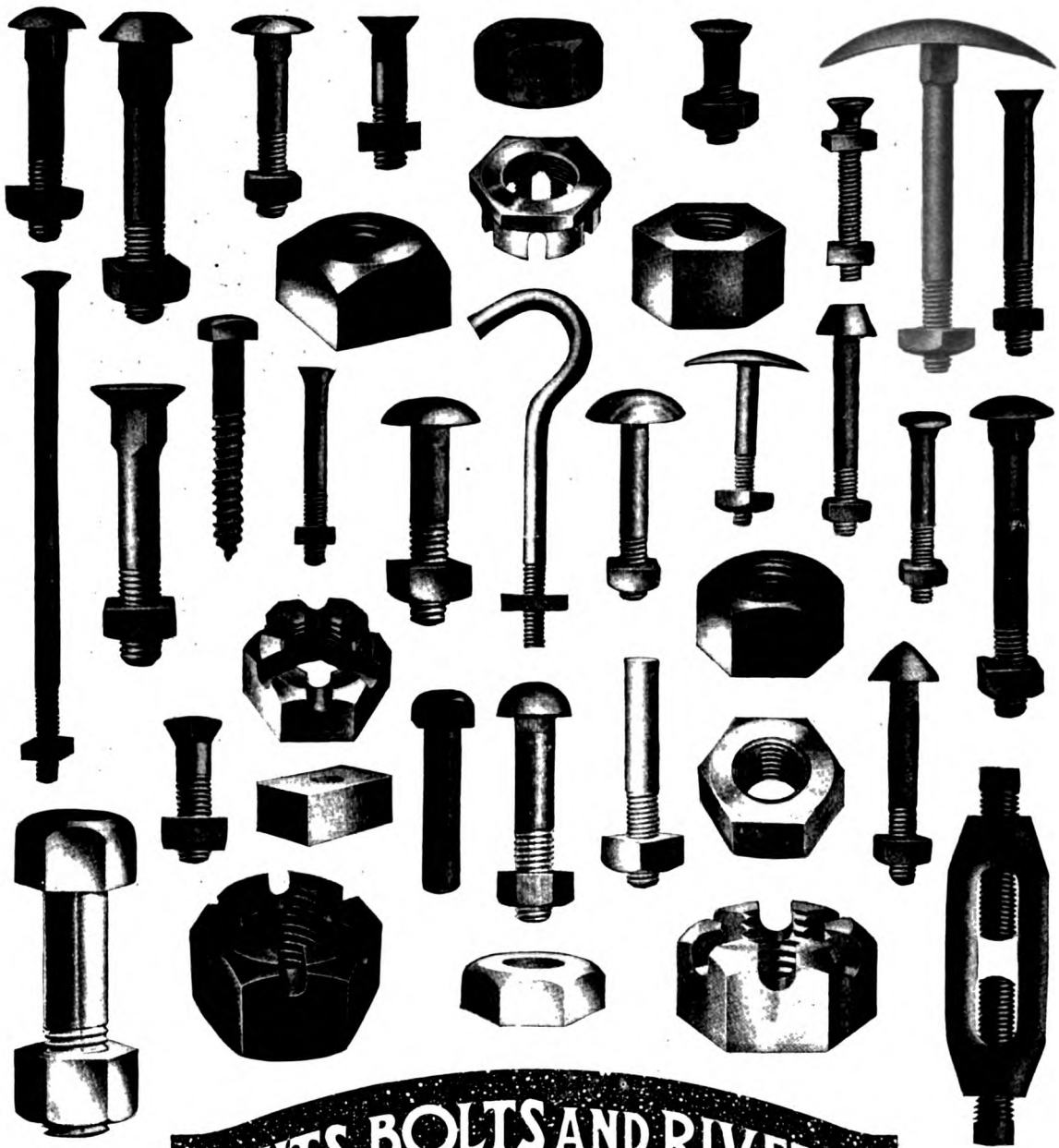

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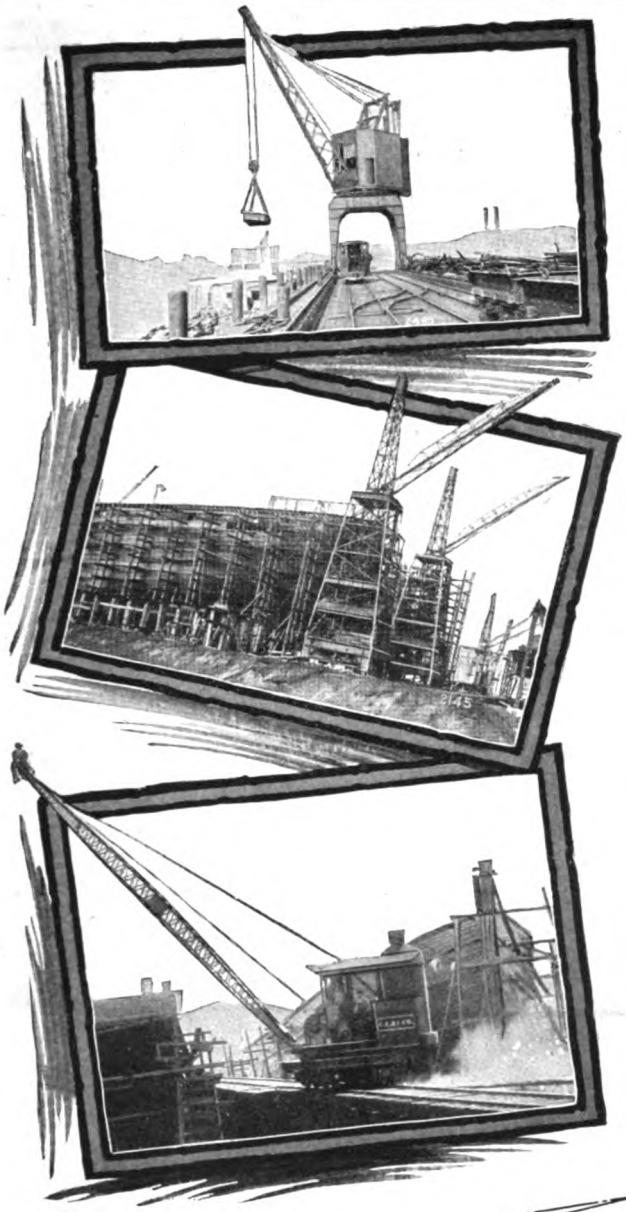

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PRESENT conditions in ship yards throughout the country demand maximum speed and efficiency. There is no other device so essential to low cost and speedy construction in a ship yard as a Crane. It is extremely useful in the general handling of material around the yard, and is indispensable for handling material during the construction of vessels on the ways.

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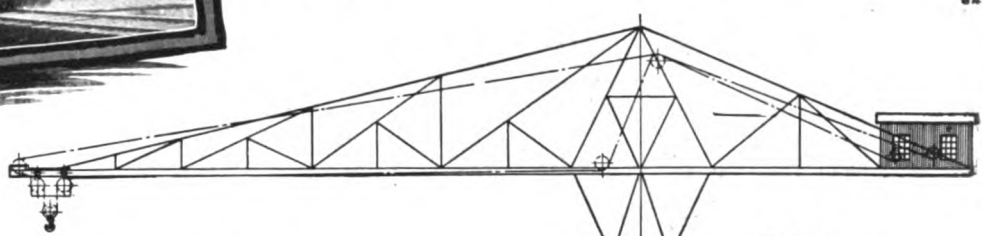

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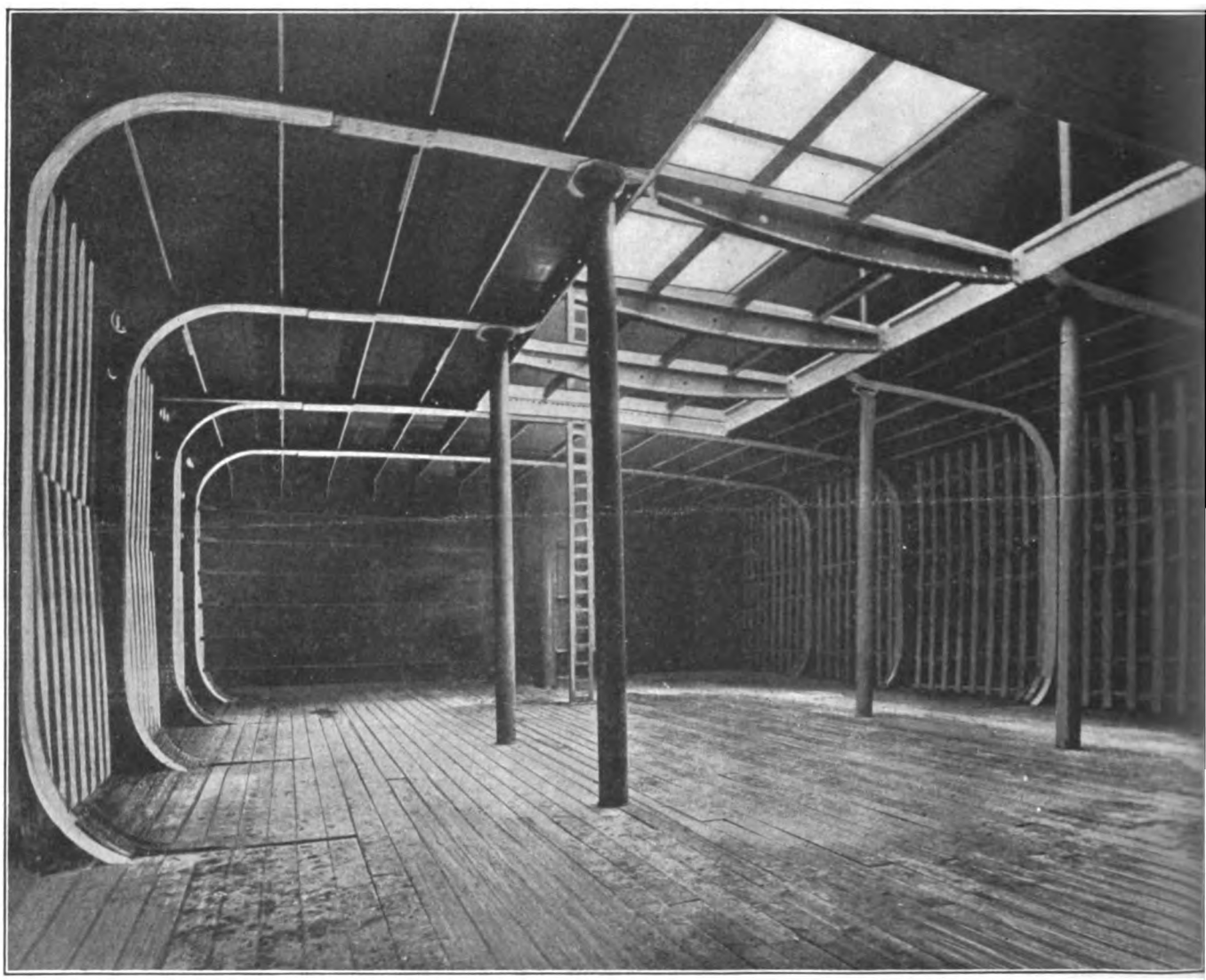

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Experience has proved that the Isherwood System makes for speedy construction and gives increased cubic and dead-weight capacity, reduced cost of maintenance, and reduced vibration at no greater first cost than a vessel of similar dimensions built on the transverse system.

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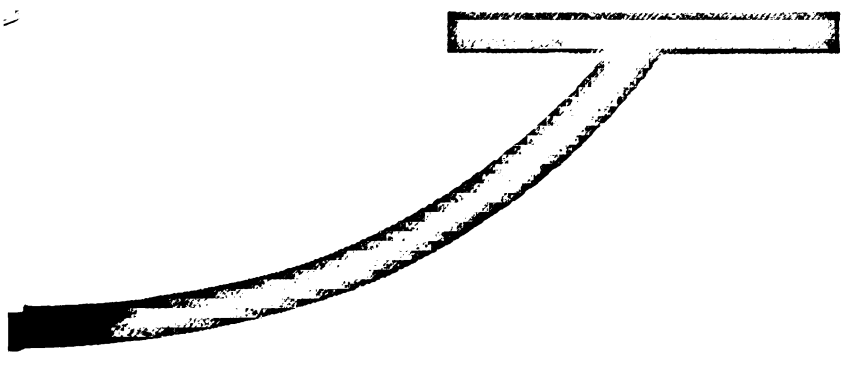

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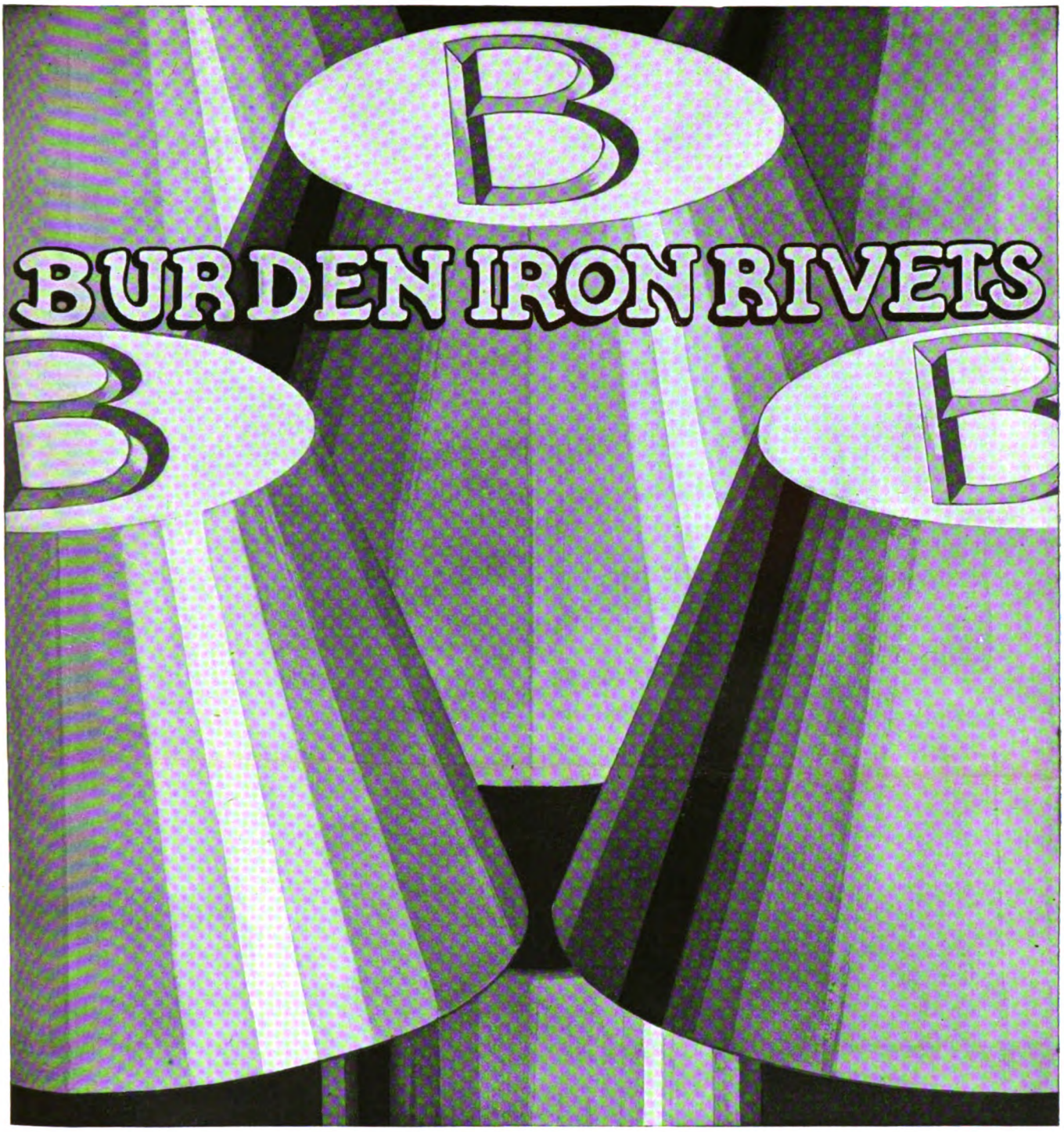

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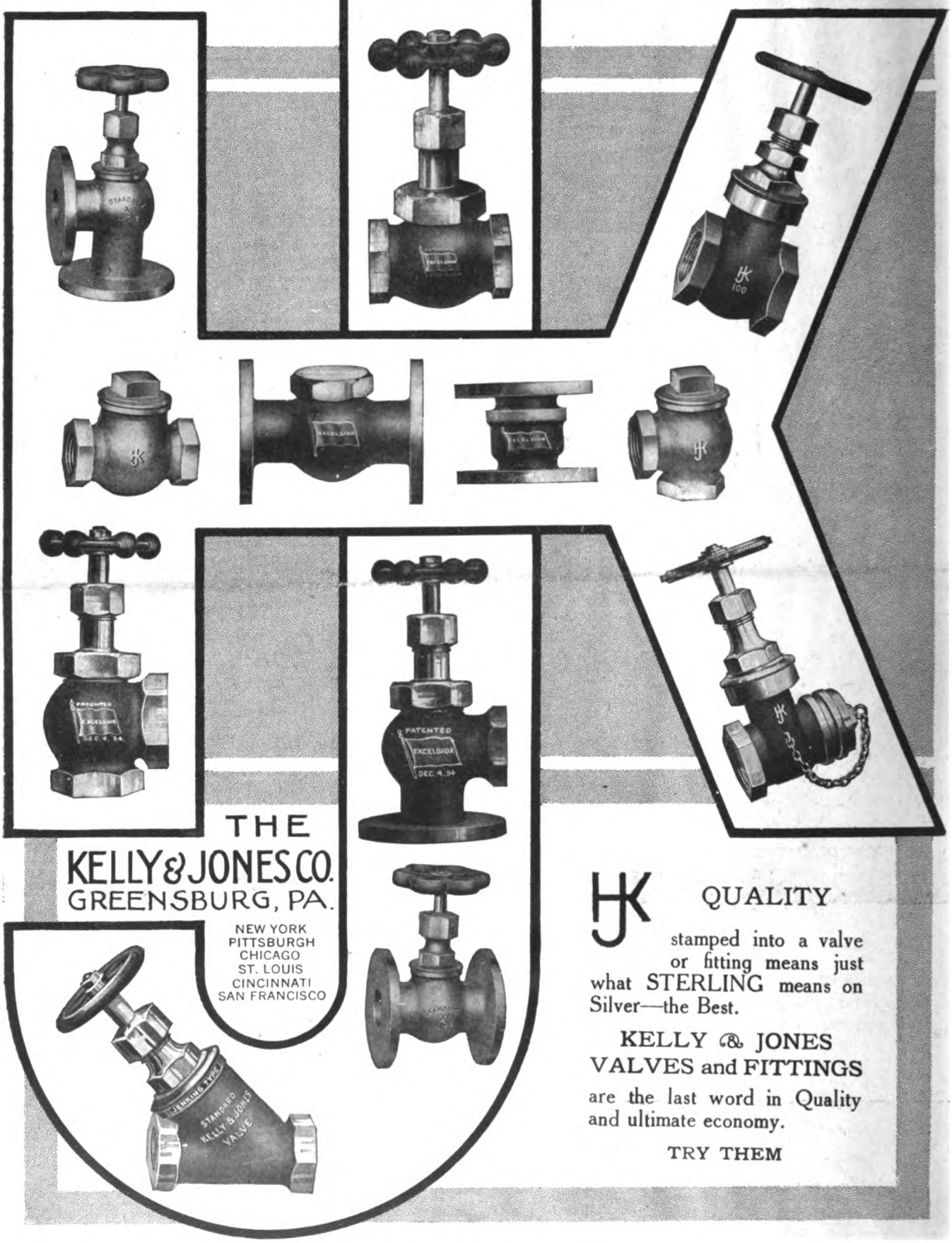

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For any kind, size or style machine, Slitters, Screw Slotters, Hack Saws, Files.
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A hydraulic and slow-hardening Iron Cement for quick permanent Power Plant repairs and invaluable for connections in damp places. Expands and contracts with metal to which applied.

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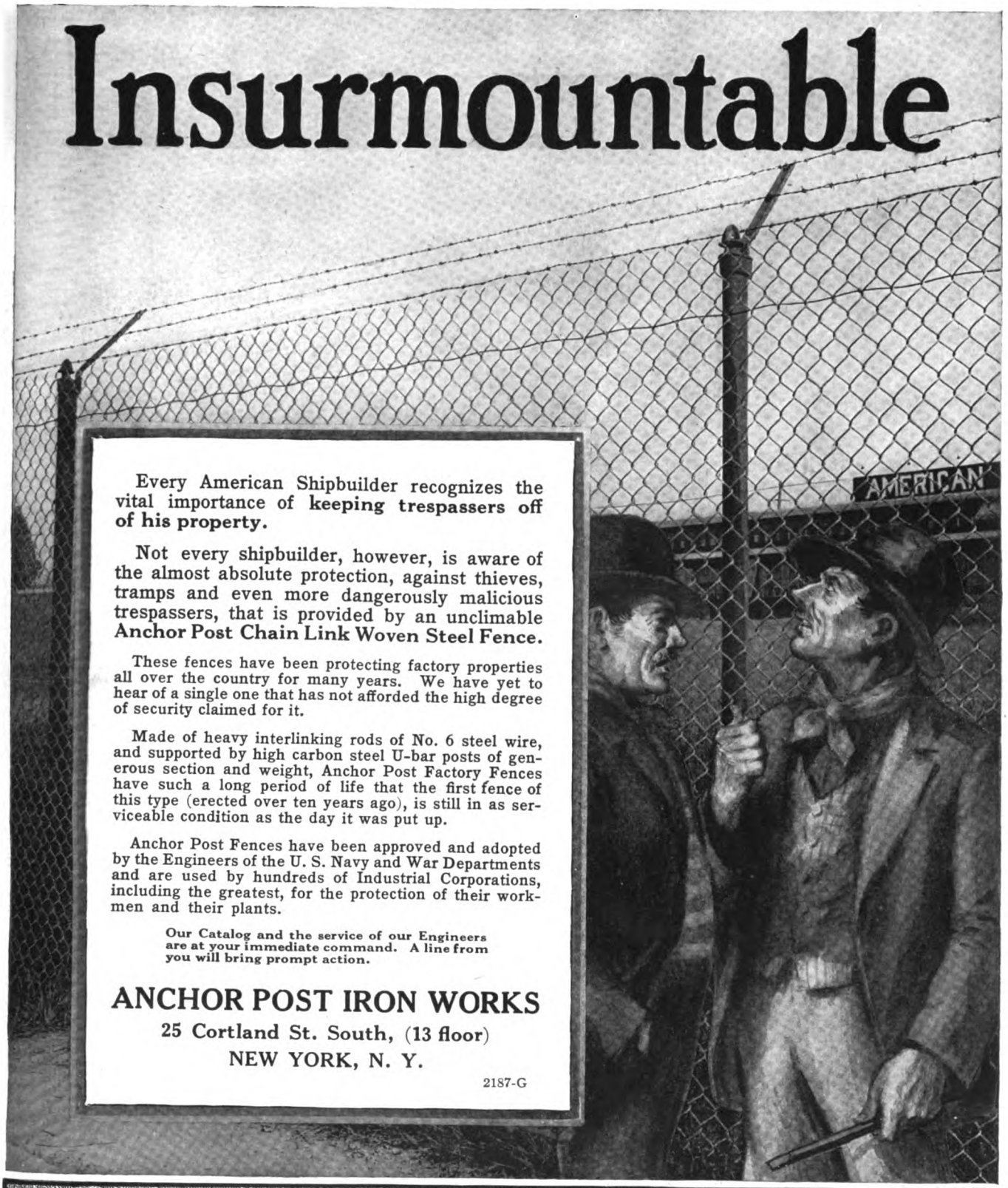
Insurmountable



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These fences have been protecting factory properties all over the country for many years. We have yet to hear of a single one that has not afforded the high degree of security claimed for it.

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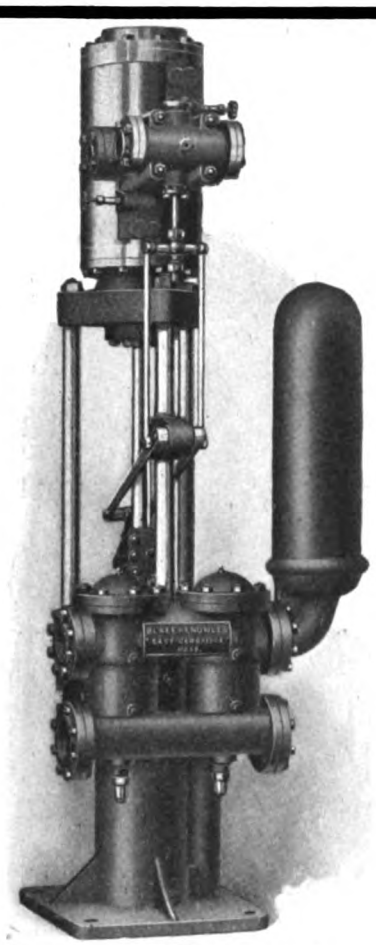

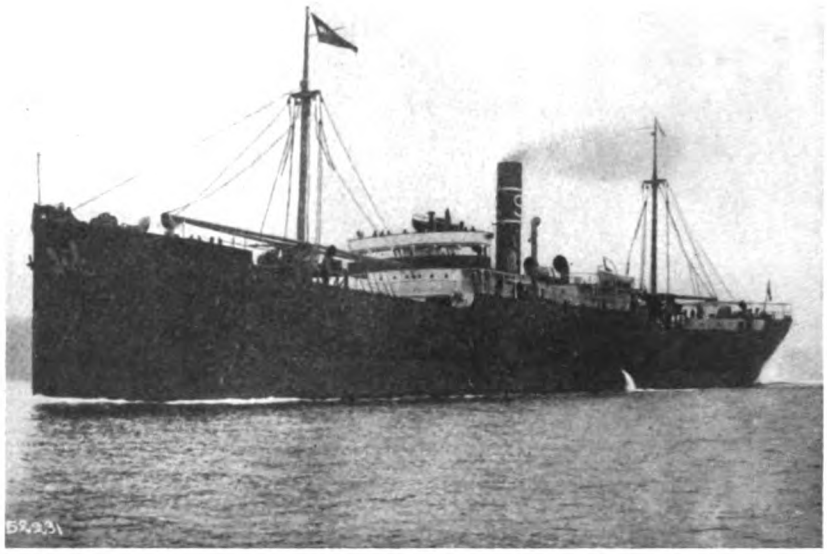

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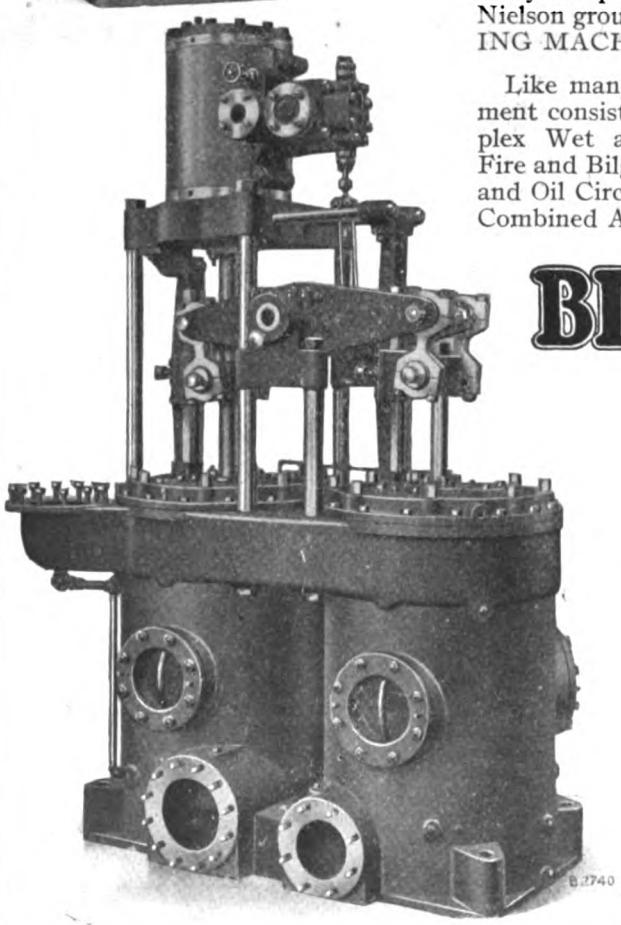
On our Merchant Fleet---
On our Battleship Fleet---

The Steamship Niels Nielson, recently launched from the Skinner Eddy Corporation Shipyard—one of four sister freight ships of the Nielson group completely outfitted with BLAKE-KNOWLES PUMPING MACHINERY of the latest type.

Like many other merchant and Naval vessels, the Neilson equipment consist of: Vertical Simplex Boiler Feed Pumps; Vertical Twinplex Wet and Dry Vacuum Pumps; Horizontal Duplex Ballast, Fire and Bilge, Sanitary, Fresh Water, Engine Room Bilge, Oil Supply and Oil Circulating Pumps; Horizontal Simplex Evaporator Feed and Combined Air and Circulating Pumps.



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Similar complete installations of BLAKE-KNOWLES PUMPING EQUIPMENT now being made on *Fourteen other boats of the same type.* By the scores, Blake Pumps are nearing completion for location on the many hulls now rapidly building for U. S. Merchant Marine—and for U. S. Government use on Battleships, Cruisers, Destroyers, etc.

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You'll Pay Anyway

¶ Every time a ship is salvaged because she can't reach a ship of the same line just over the horizon

¶ Every time a ship heaves-to and waits for a tug to tow her in

¶ Every time a ship lays up to await the arrival of repair parts

The owner loses real money.

Lost minutes mean lost dollars.

Cutting & Washington Wireless

The boat owner who installs CUTTING & WASHINGTON apparatus pays for his equipment once and for all from the savings it effects. The boat owner whose boats are not equipped with wireless loses, every few months, more than the cost of CUTTING & WASHINGTON equipment.

You will pay for wireless on your boats whether you buy it or not — the question is whether you will buy it and pay once, or not buy it and pay many times. We respectfully submit the question to your better judgment.

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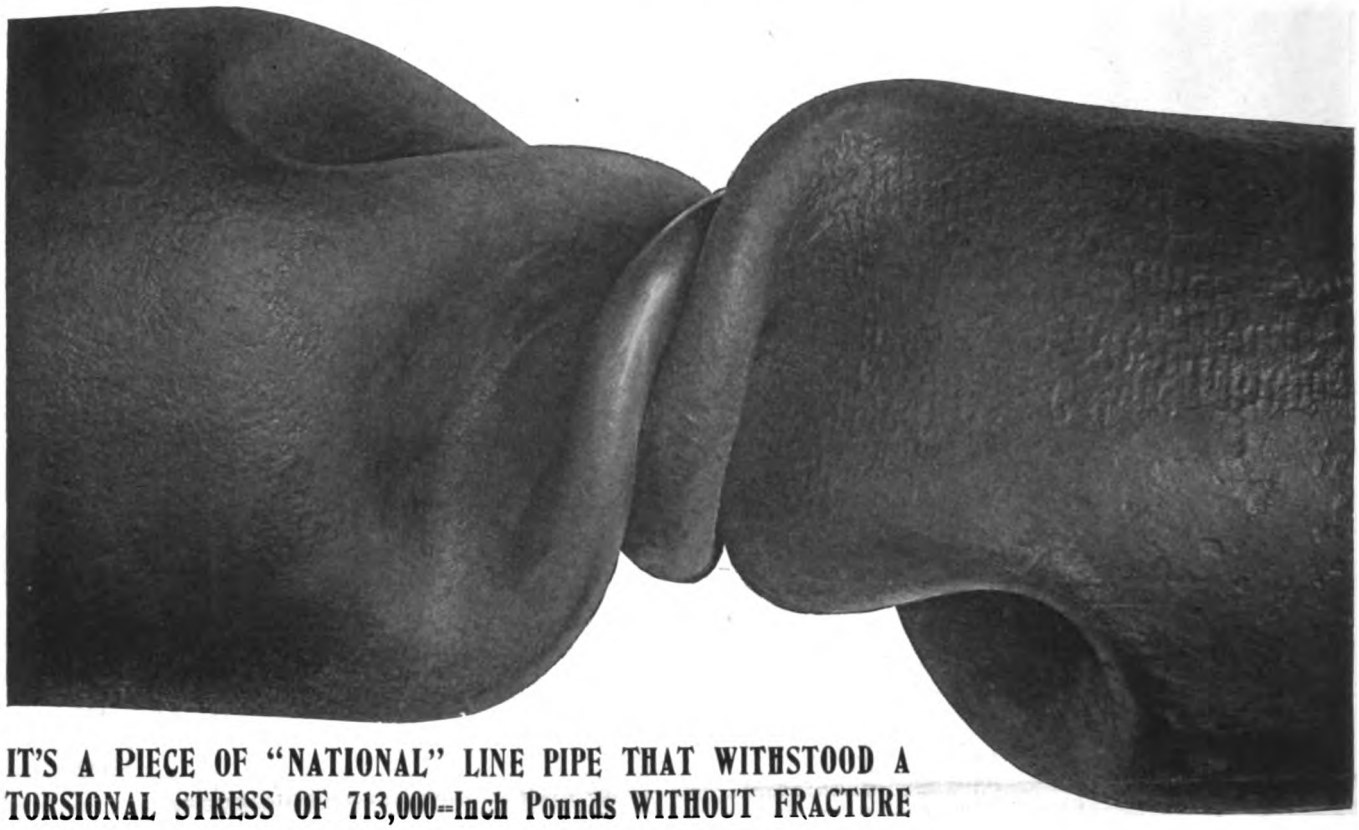
RUBBER? NO!



IT'S A PIECE OF "NATIONAL" LINE PIPE THAT WITHSTOOD A TORSIONAL STRESS OF 713,000-Inch Pounds WITHOUT FRACTURE

¶ This shows a piece of 8-inch "NATIONAL" Line pipe subjected to a twisting strain of 713,000-inch pounds. In appearance this looks almost like a piece of rubber, but when it is remembered that this pipe has a thickness of about one-third of an inch and weighs about twenty-nine pounds per foot, the enormous twisting strain can be appreciated. No sign of fracture appears in the material.

¶ This is only one of many experiences wherein the wonderful ductility of "NATIONAL" Pipe has been demonstrated, showing the remarkable quality of the material.

¶To readily identify "NATIONAL" material and as protection to manufacturer and consumer alike, the practice of National Tube Company is to roll in raised letters of good size on each few feet of every length of welded pipe the name "NATIONAL" (except on the smaller butt-weld sizes, on which this is not mechanically feasible on these smaller butt-weld sizes the name "NATIONAL" appears on the metal tag attached to each bundle of pipe).

¶When writing specifications or ordering tubular goods, always specify "NATIONAL" pipe, and identify as, indicated.

¶In addition, all sizes of "NATIONAL" welded pipe four in. and under are subjected to a roll-knobbling process known as Spellerizing to lessen the tendency to corrosion, especially in the form of pitting. This Spellerizing process is peculiar to "NATIONAL" pipe, to which process National Tube Company has exclusive rights.

¶"NATIONAL" pipe was awarded the GRAND PRIZE (highest possible award) at Panama Pacific International Exposition, 1915.

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Name Rolled in Raised Letters on National Tube Company Pipe

It pays to be **NATIONAL** *ly Prepared*

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REDUCE YOUR FUEL COSTS 40%

This saving is accomplished under actual service conditions, not manufacturers' test.

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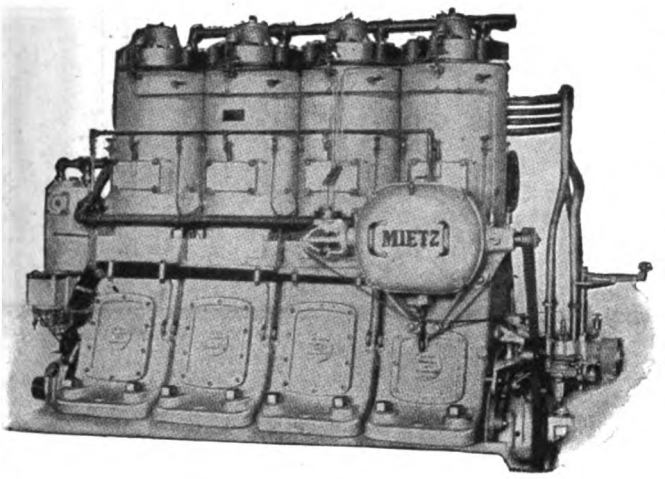

is the pioneer of this type operating on low grade fuels exclusively. Does not use any of the high pressures and is free from the use of complicated auxiliaries and does away entirely with Electric Ignition devices, carburetors, valves, etc. Built in sizes from 15 to 400 H. P. in both reversing gear and direct reversible types.

MIETZ OIL ENGINE

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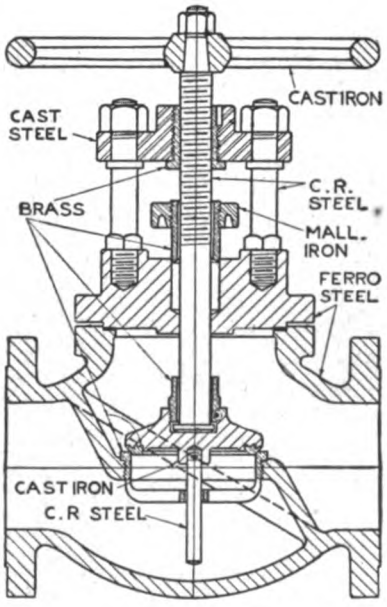
MARINE VALVES



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Globe and Angle

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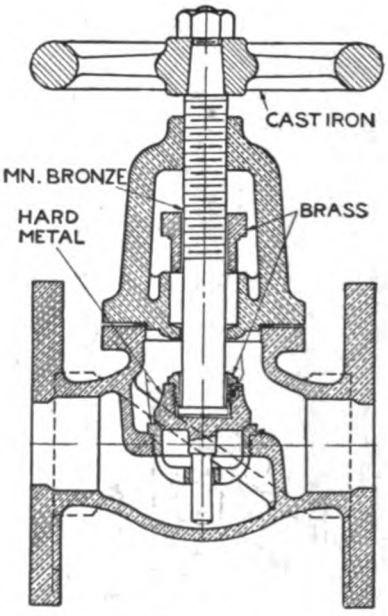

No. 87E

All Brass Bolted Yoke

Boiler Feed Stops

Screw Down Checks;
Surface Blows;
Main Blow-Offs.

ALSO MAIN INJECTION VALVES, OVERBOARD CHECKS, GLOBE, ANGLE AND GATE VALVES, POP SAFETY VALVES, PRESSURE REGULATORS, WATER RELIEF VALVES, ETC.

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Should Get What They Have A Right To Expect

"Pure Manila" is more often claimed for a rope than found.

No rope containing a trace of other fibre can properly or honestly be classed as "Pure Manila."

The fact that it is labeled "Pure Manila" or "Best Manila," and that it may contain some Manila or a large percentage of Manila, does not improve the deception.

True Manila Quality can only be obtained by All-Manila Manufacture.

If the purchaser of Manila rope is to get what he has a right to expect, he must know that it is made of Manila Hemp exclusively. It is on this basis that

"WHITLOCK ALL-MANILA"

has always been offered to buyers of rope,—guaranteed All-Manila of uniformly high grade, unexcelled for strength, yardage and durability.

Look for this Trademark

The Rope that Endures
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TRADE MARK
ALL-MANILA

WHITLOCK CORDAGE COMPANY

Department M **46 South Street, New York**

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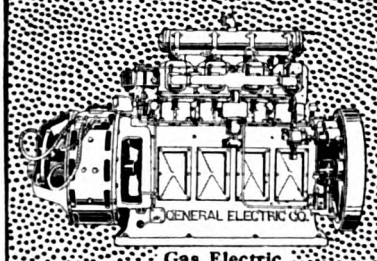

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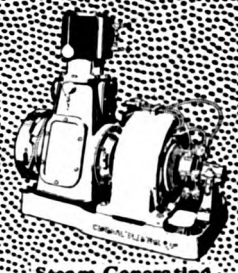
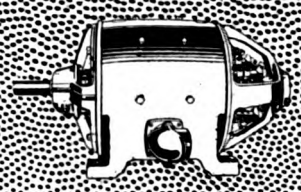
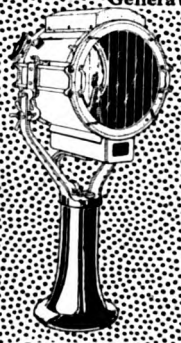

Steam Generating Set


Motor

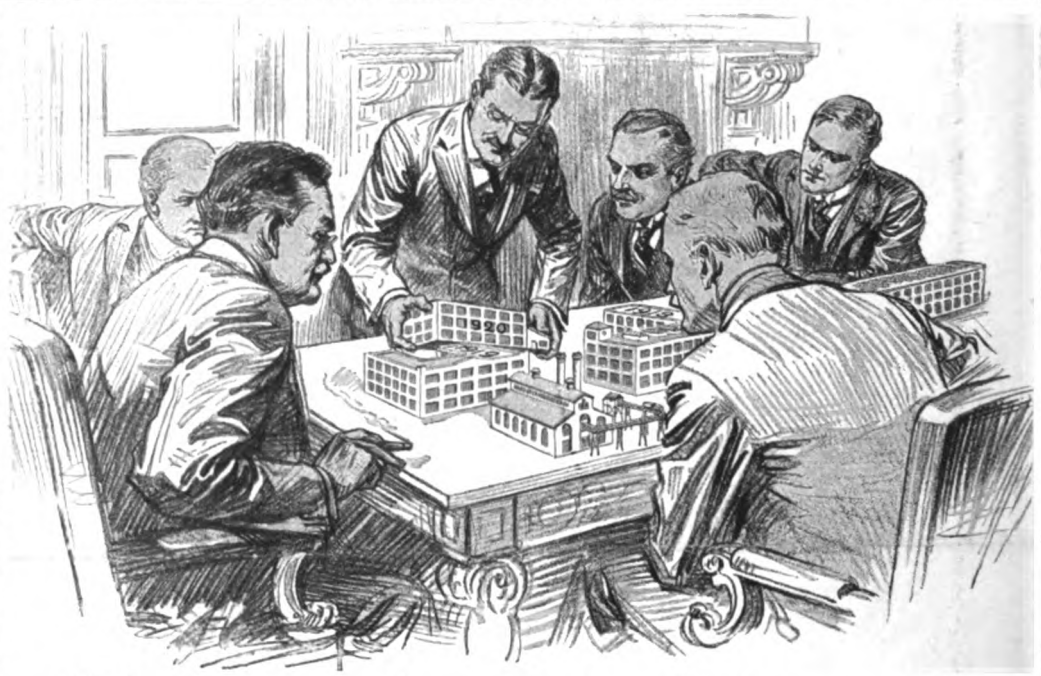
Marine Arc Lamp

Fan


Searchlight

Switchboard

Mazda Lamp



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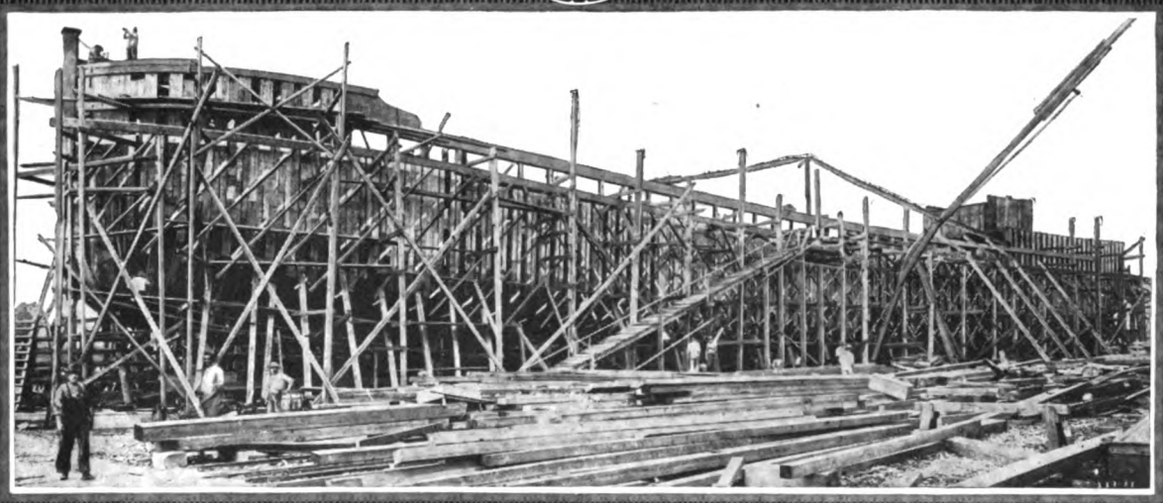

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One 1500 KW. General Electric-Curtis vertical, 2 or 3 ph., 1150 volts, form T, 8 pole, 900 RPM.
Two 1000 KW. General Electric-Curtis vertical, 3 ph., 2300 volts, 1200 RPM., with condensers.
One 1000 KW. Allis Chalmers horizontal, 2 or 3 ph., 2300 volts, 1800 RPM., with condenser.
One } 750 KW. General Electric-Curtis vertical, form P, 3 ph., 4 pole, 4600
} or 2300 volts, 1800 RPM.
One 750 KW. General Electric-Curtis horizontal, type ATB, 3 ph., 2300 volts, condensing, with 9½ KW. turbo-generator exciter set.
Two 500 KW. General Electric-Curtis vertical, type ATB, form T, 3 ph., 4000 or 2300 volts, 1800 RPM., with exciter and condensers.
One 400 KW. Westinghouse-Parsons horizontal, 2 or 3 phase, 2200 volts, 3600 RPM., with condenser.
One 300 KW. Westinghouse-Parsons horizontal, 3 phase, 440 volts, 3600 RPM., with condenser.
One 156 Kva. Westinghouse-Parsons horizontal, 3 ph., 480 volts, 3600 RPM., with exciter.
One 100 KW. General Electric-Curtis horizontal, 2 or 3 ph., 240 volts, 3600 RPM., with dir. conn. exciter.

Direct Connected Alternating Current Units

60-Cycle

One 475 KW. General Electric, 2300 volts, 120 RPM., dir. conn. to 18 & 36" x 36" Lane & Bodley horizontal cross compound engine.
Two 425 KW. Allis Chalmers-Bullock, 2200 volts, rev. fld., 150 RPM., dir. conn. to 26" & 42" x 27" Erie Ball horizontal cross compound engines.
One 300 KW. Westinghouse, 2300 volts, 180 RPM., dir. conn. to 16" & 30" x 24" Penn Iron Works horizontal 4-valve cross compound engine.
One 175 KW. Westinghouse, 220 volts, 225 RPM., dir. conn. to 20" x 18" Fleming-Harrisburg left hand engine
One 50 KW. Ft. Wayne, 2300 volts, 300 RPM., dir. conn. to 11" x 12" Chuse horizontal 4-valve engine.

Motor-Generator Sets

60-Cycle

One 375 KW. set, consisting of one 375 KW. Gen. Elec. type MP generator 250 volts, 6 poles, compound wound, serial No. 115339, on common base and direct connected to 400 KW. Gen. Elec. synchronous motor, type ATI, 3 ph., 60 cy., 2300 volts, 12 poles, 600 RPM., serial No. 93629, with direct connected exciter.
One 300 KW. set consisting of one 300 KW. Westg. generator, 220 vo shunt wound, dir. conn. to 400 HP. type CX Westg. motor, 3 ph., 60 cy., 440 volts, 720 RPM.
Two 300 KW. set, consisting of two 150 KW. Gen. Elec. generators, type MP-6, 140 volts, 1070 amps., shunt wound, serial Nos. 134456 and 134457, on common base and direct coupled on either side of 450 HP. Gen. Elec. type I-K motor, 3 ph., 60 cy., 10 pole, 4000/2300 volts, 720 RPM., serial No. 120646, with generator panel.
One 300 KW. set, consisting of one 300 KW. General Electric generator 250 volts, 4 pole, flange coupled to one 400 HP. General Electric form K induction motor, 3 ph., 60 cy., 2300 volts, 400 RPM.
One 150 KW. set, consisting of one 150 KW. Allis Chalmers generator, type A, class I, 250 volts, 250 amps., compound wound, serial No. 82596, dir. com. on common base to one 225 HP. Allis Chalmers induction motor, type A, class I, 3 ph., 60 cy., 440 volts, 268 amps., 1150 RPM., serial No. 82593, complete with switchboard panels.
One 75 KW. set, consisting of one 75 KW. General Electric type CL generator, 120 volts, 6 pole connected by flexible coupling to one 100 HP. Burke motor, 3 ph., 60 cy., 2300 volts, 900 RPM.

Motor-Generator Sets—Continued

One 40 KW. set consisting of one 40 KW. General Electric, type MPC, form L generator, 125 volt, 6 pole interpole, on common base and direct coupled to 65 HP. General Electric form K motor, 3 ph., 550 volts, 1200 RPM.
One 37½ KW. set consisting of one 37½ KW. Westinghouse type N generator, 250 volts, coupled to one 50 HP. Westinghouse CCL motor, 3 ph., 220 volts, 850 RPM.
One 35 KW. set consisting of one 35 KW. Allis Chalmers-Bullock generator, 120 volts, coupled to 50 HP. Westinghouse type C motor, 850 RPM.
One 35 KW. set consisting of one 35 KW. Allis Chalmers generator, 116 to 120 volts, 4 pole, compound wound, dir. connected on common base with 50 HP. Allis Chalmers motor, 2300 volts, 850 RPM.
One 10 KW. set consisting of one 10 KW. Allis Chalmers generator, 120 volts, mounted on common base and shaft with 15½ HP. Allis Chalmers motor, 3 phase, 440 volts, 1130 RPM.

Hoists

Electric Driven

One Flory cableway electric hoist, 2 drums, one smooth drum 60" diam tapering to 42" diam. x 46½ in. face, one drum 48" diam. grooved for ¾" wire rope, driven by 300 HP. General Electric ITC slip ring motor, form M, 60 cycle, 440 volts.
Two Maine electric hoists, 2 drums, 7" flanges, 32" between flanges, 5 operating levers, ratchets, operating lever, etc., direct connected to 75 HP. Maine slip ring motors, 220 volts, 3 phase, 60 cycle, 865 RPM.
Two Williamson electric hoists, 2 drums, 2 speed, drums 17" diam. x 32" face, 4½" flanges, dir. conn. to 75 HP. General Electric induction motors, ITC, form M, 60 cycle
Eight Flory electric hoists, 2 drum, 2 speed, drums 16" diam. x 30" between flanges x 11" flanges, with six operating levers, direct connected to 75 HP. General Electric slip ring motors 60 cycle.
One Maine electric hoist, 3 drum, one drum 18" x 32½" face with 7" flange, two drums 14" x 32" face, 9" flanges, driven by 75 HP. Main 60 cycle slip ring motor, 220 volts, 865 RPM.
Two Maine electric hoists, 2 drum, drums 18" x 32" face, 7" flanges, driven by General Electric type M motors, 75 HP., 3 phase, 60 cycle, 220 volts, 900 RPM.
Two Meade Morrison electric hoists, 2 drums, drum 30" x 24" face, 3" flanges, with 40 HP. Westinghouse variable speed motors, 500 volts direct current.
Two Lambert, electric hoists, 2 drums, drums 16" x 18" face, 5½" flanges, direct geared to 37 HP. General Electric ITC motors, 3 phase, 60 cycle, 220 volts, 1200 RPM
Three Lidgerwood single drum mine hoists, drums 30" diam. x 24" face, 4" flanges, gear ratio 18:126, geared to Westinghouse type 10-K motors, series wound, with R-32 controllers and grid resistances. Two motors 220 volts, 525 RPM., one motor 550 volts, 878 RPM.
Two Lidgerwood single drum electric mine hoists, drums 30" x 24" face, 4" flanges, direct geared to General Electric form M slip ring motors type IQC, 2 phase, 60 cycle, 220 volts, 830 RPM., complete with T-10 controller.
Five Lidgerwood single drum electric mine hoists, drums 30" diam. x 24" face, 4" flanges, direct geared to Westinghouse motors type 10-K, series wound, 52 HP., 220 volts direct current, 700 RPM., complete with R-32 controllers and grid resistances.

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One 600 HP. Stirling, 150 lbs. pressure.
One 572 HP. Heine, 170 lbs. pressure.
One 517 HP. Stirling, 150 lbs. pressure.
One 443 HP. Stirling, 200 lbs. pressure.
Three 406 HP. Heine, 200 lbs. pressure. NEW. With Taylor stokers.
Six 400 HP. Babcock & Wilcox, 160 lbs. pressure.
Six 400 HP. Wickes vertical, 110 lbs. pressure.
Six 360 HP. Erie City, 160 lbs. pressure.
One 310 HP. Stirling, 200 lbs. pressure.
Two 240 HP. Stirling, 140 lbs. pressure.
Two 150 HP. Babcock & Wilcox, 160 lbs. pressure.

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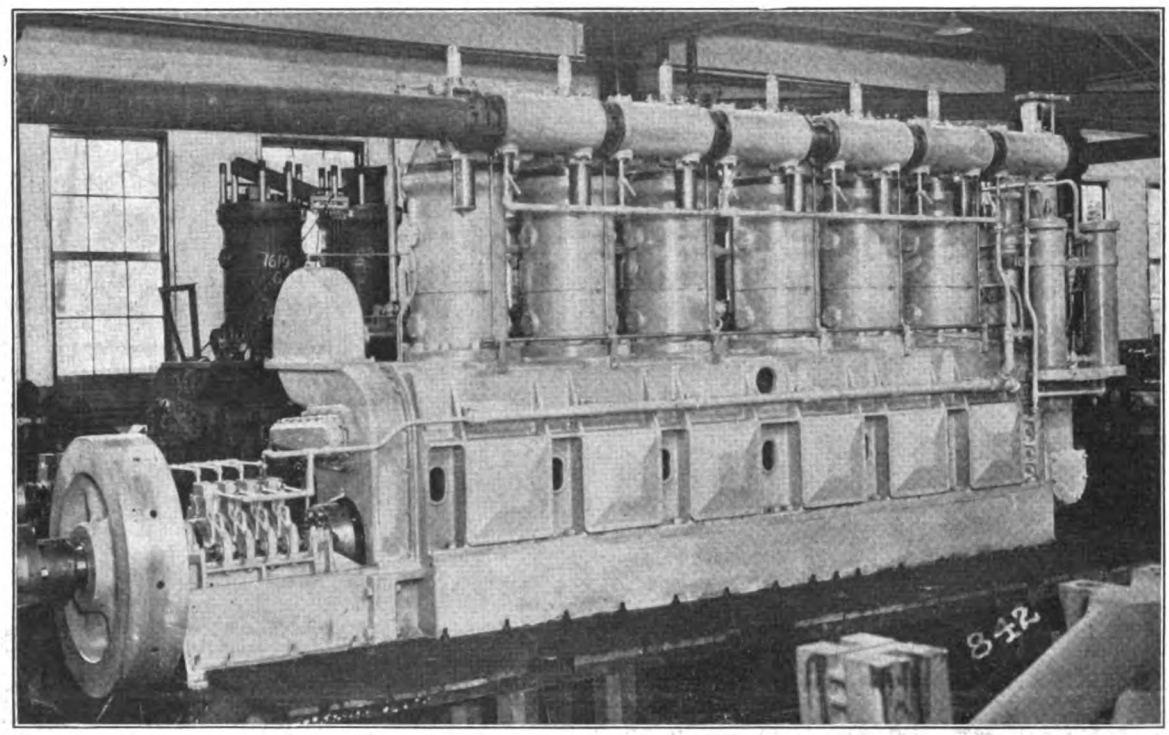

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These engines are built in the LARGEST and most COMPLETELY EQUIPPED PLANT in this country which is devoted EXCLUSIVELY to the building of Diesel Type Oil engines.

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Full Diesel type motor ships CAN CARRY MORE CARGO for a given displacement than a steam ship; as the space required for the Diesel type oil engine and fuel is much less than that required by steam engines, condensers, boilers and the necessary coal bunkers.

On account of the extremely LOW FUEL CONSUMPTION (about one-third of a pound per I.H.P.) much LESS FUEL IS REQUIRED by a motor ship.

The oil fuel, which can be handled through pipes by a pump, CAN BE STORED in parts of the ship that are INACCESSIBLE FOR COAL and can be much MORE EASILY HANDLED.

Because of the extremely small fuel consumption FUEL enough CAN BE CARRIED for EXTREMELY LONG VOYAGES.

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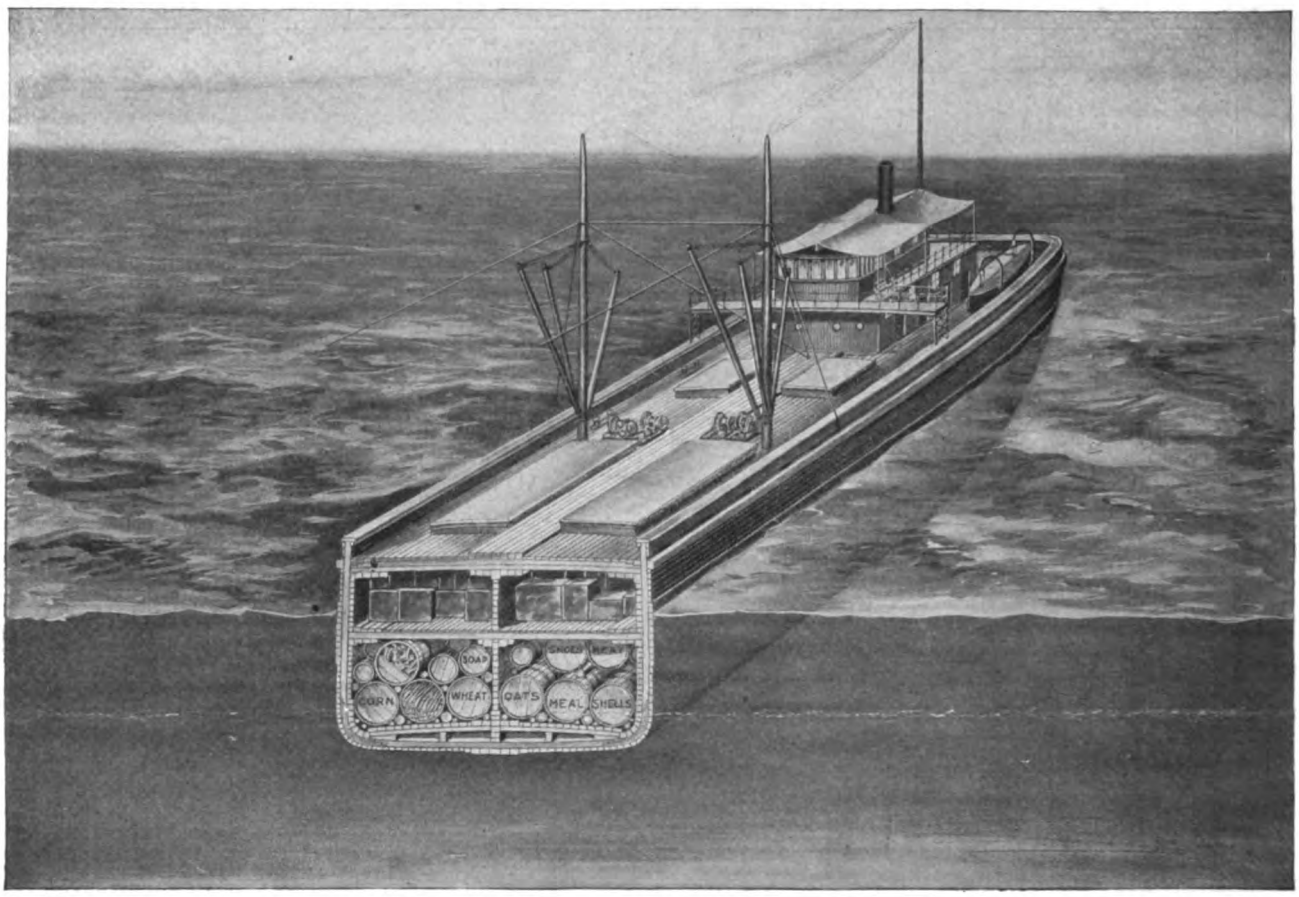

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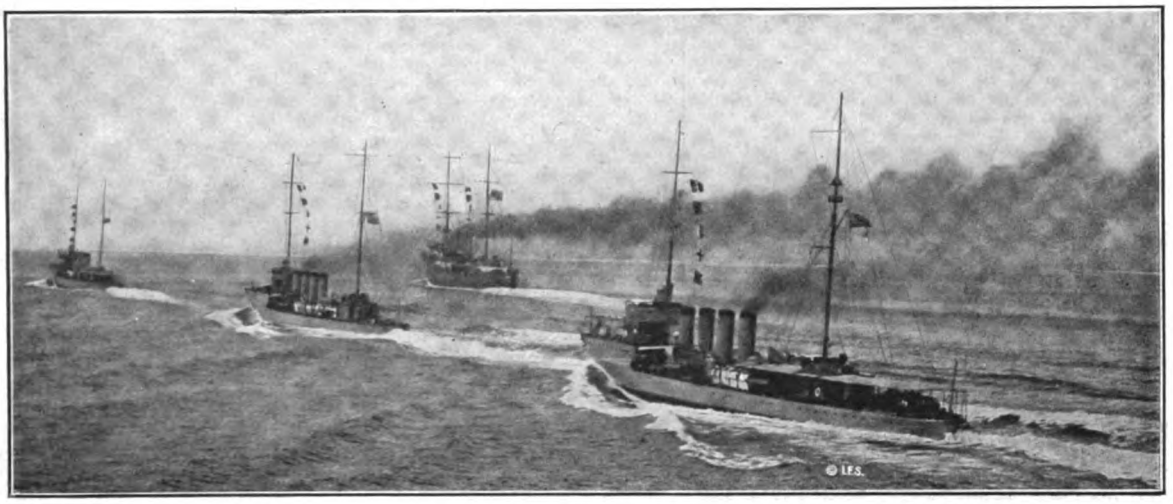

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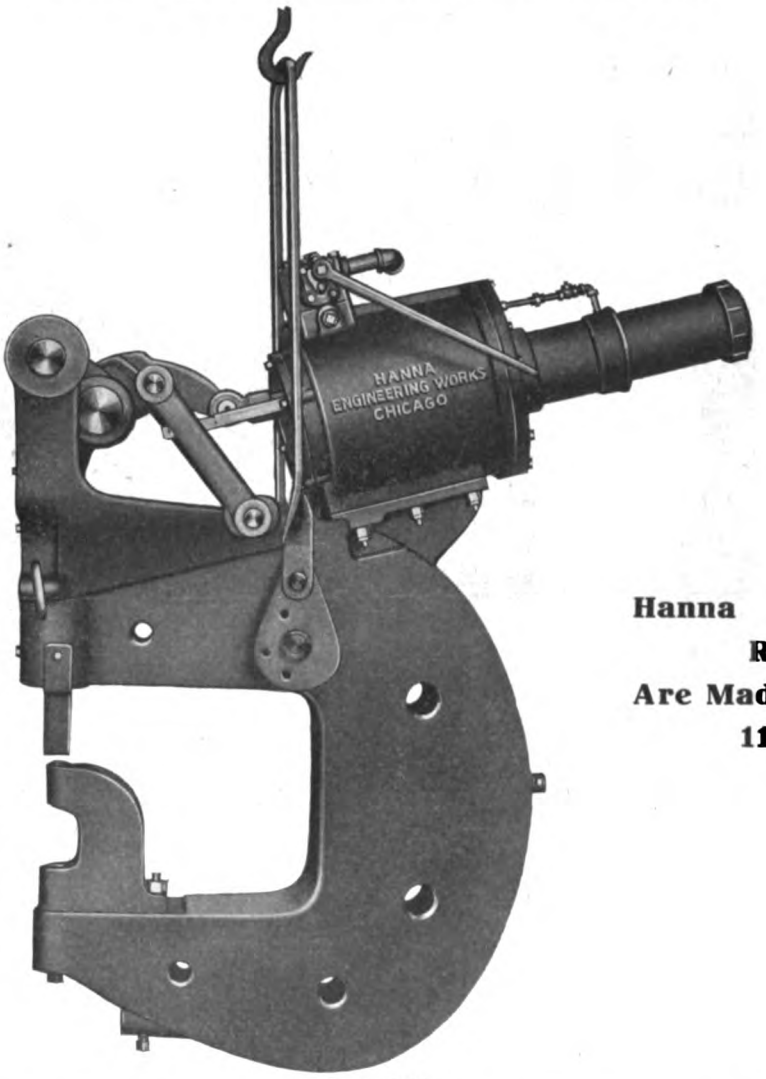

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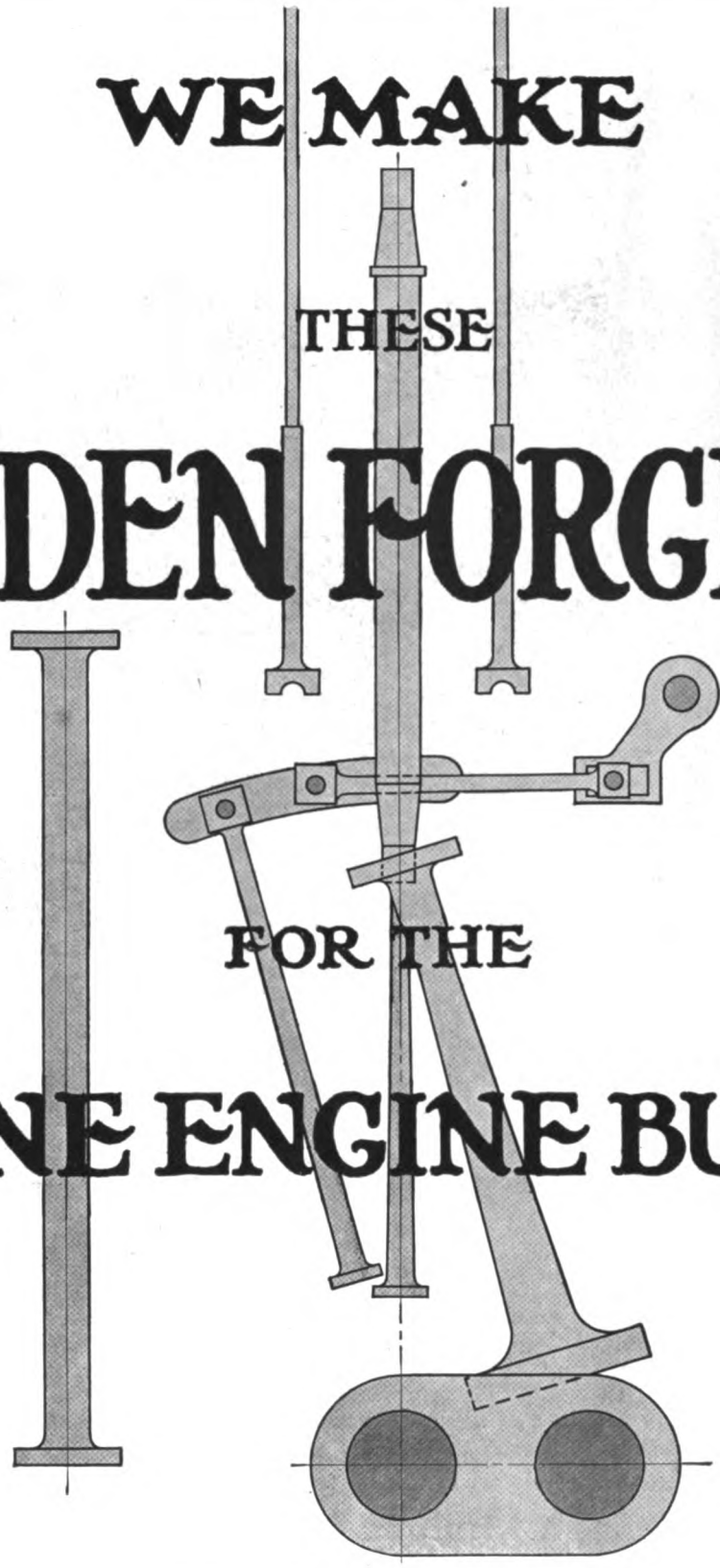

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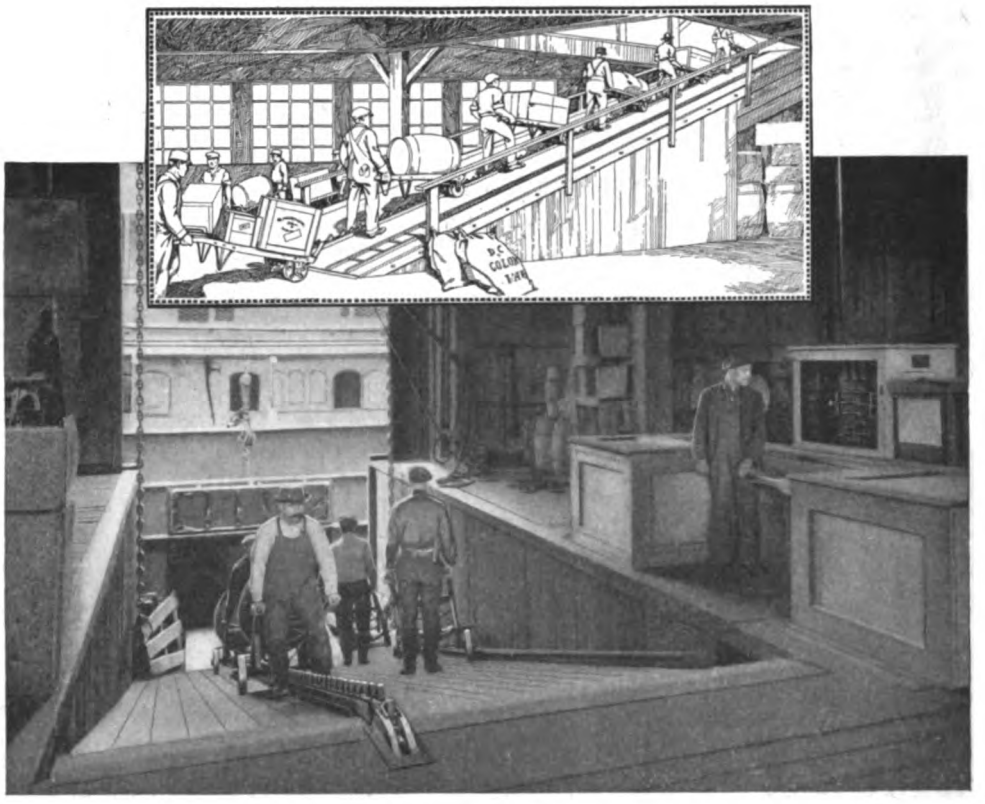

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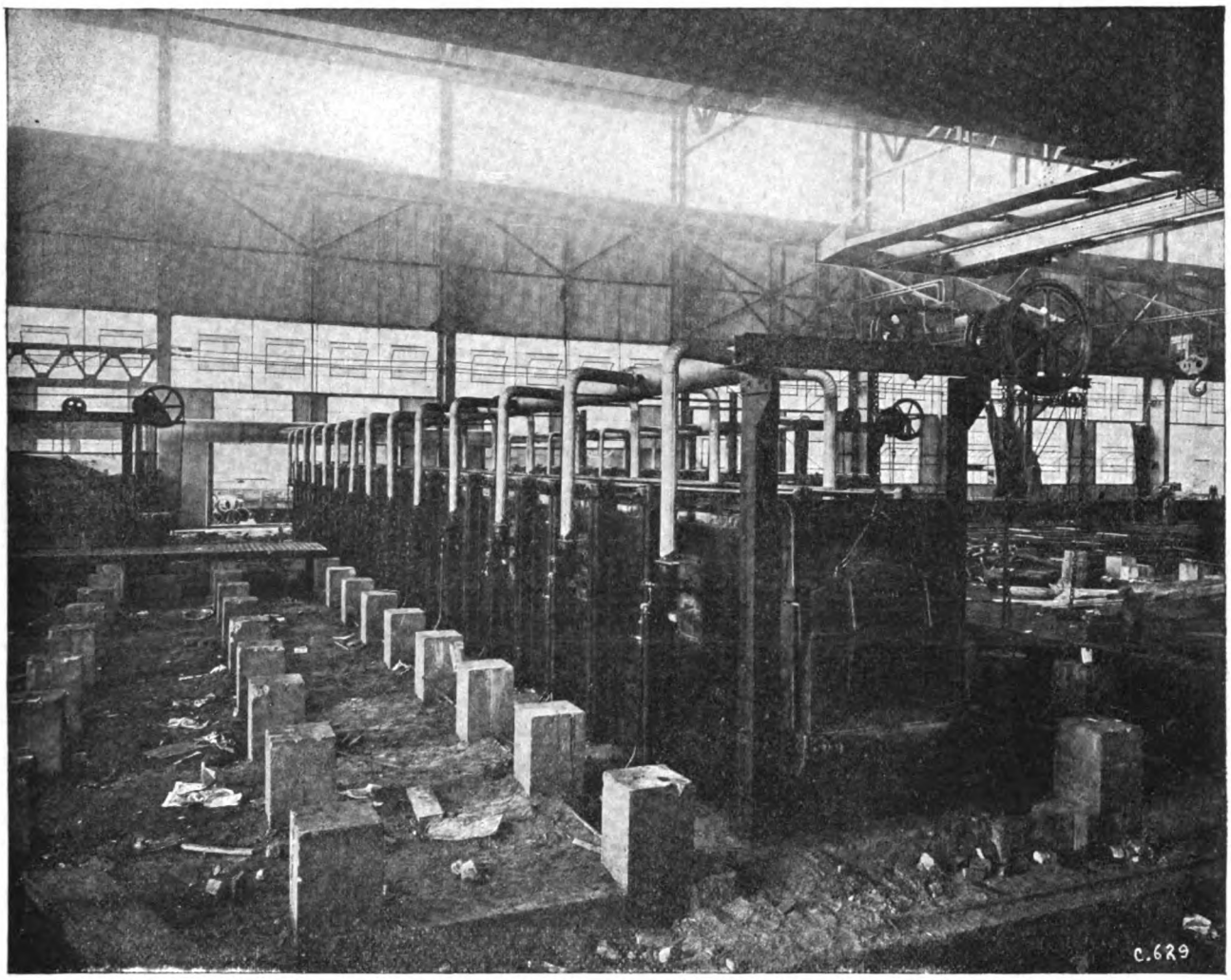

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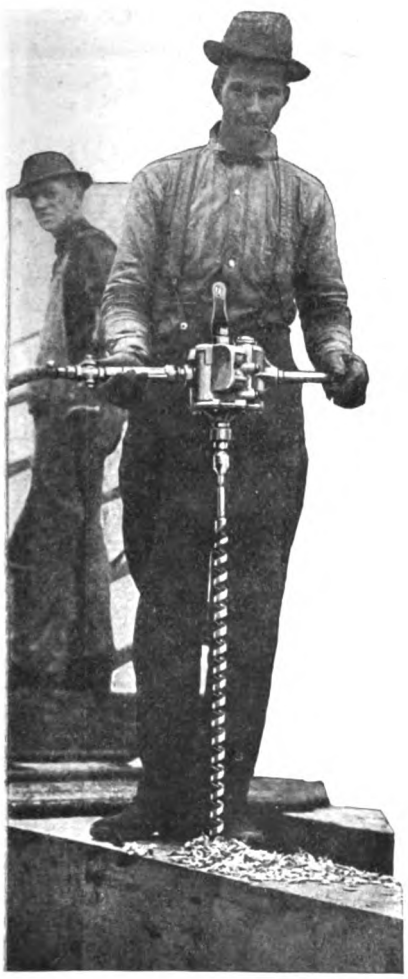

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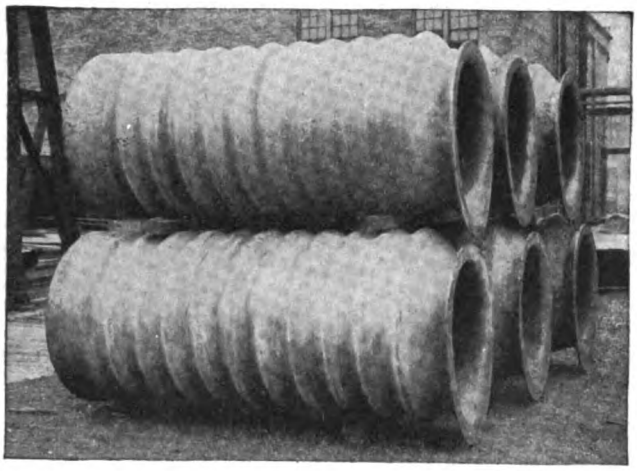

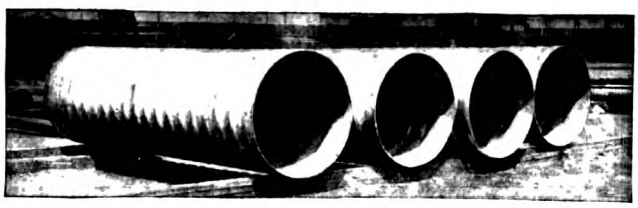

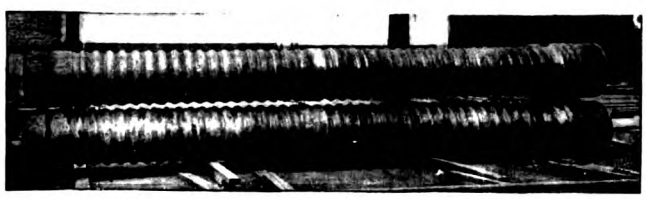

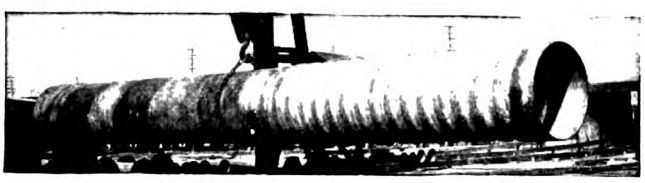

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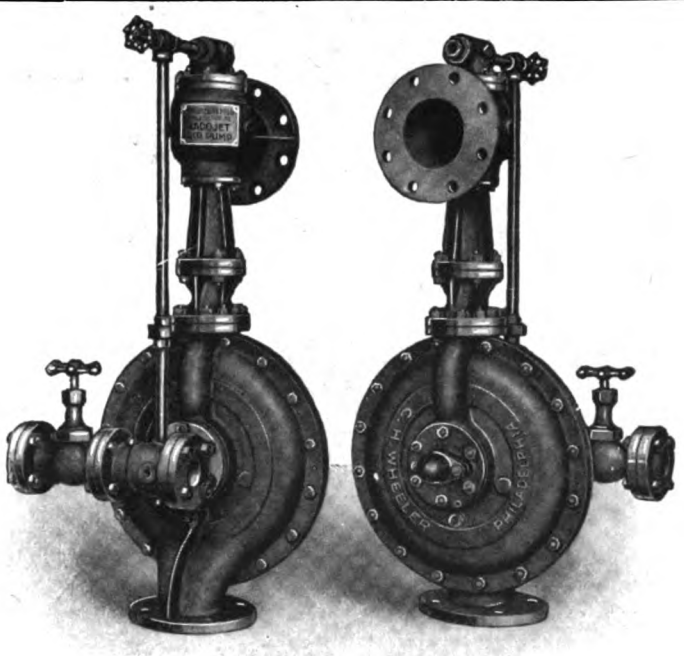

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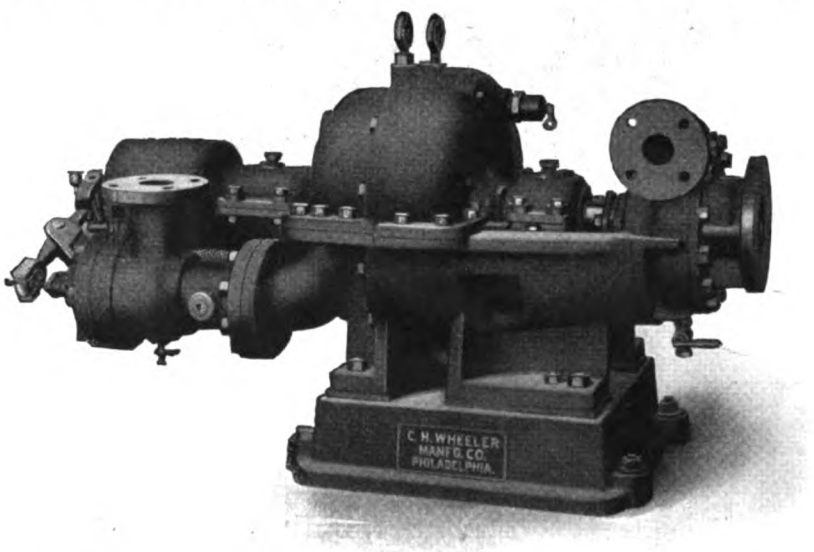

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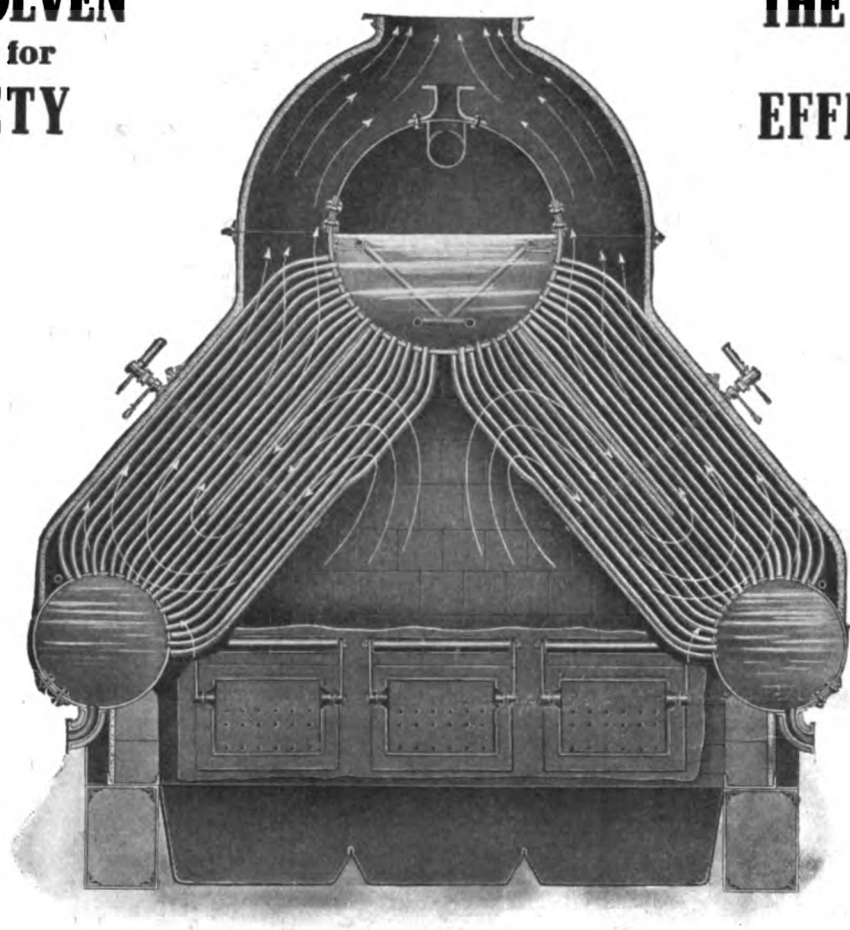

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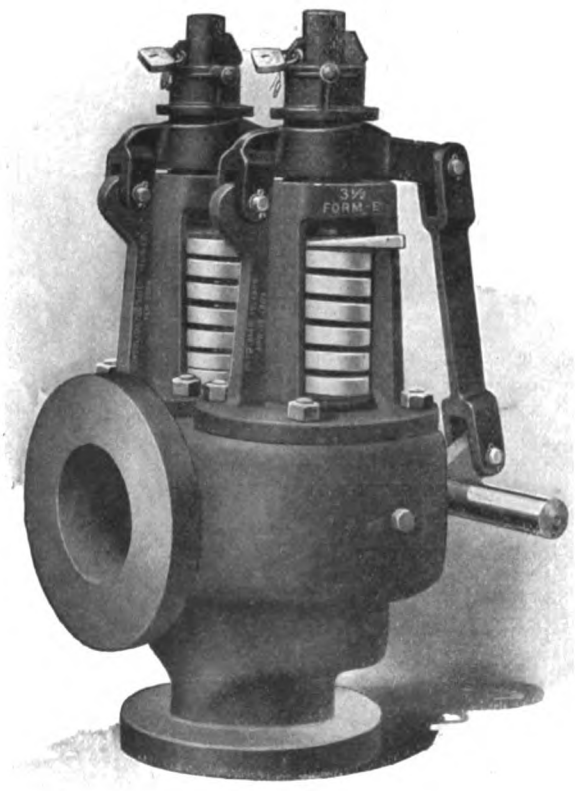

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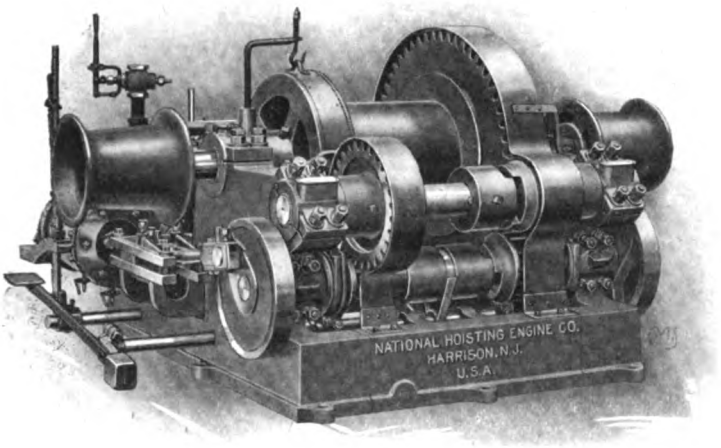

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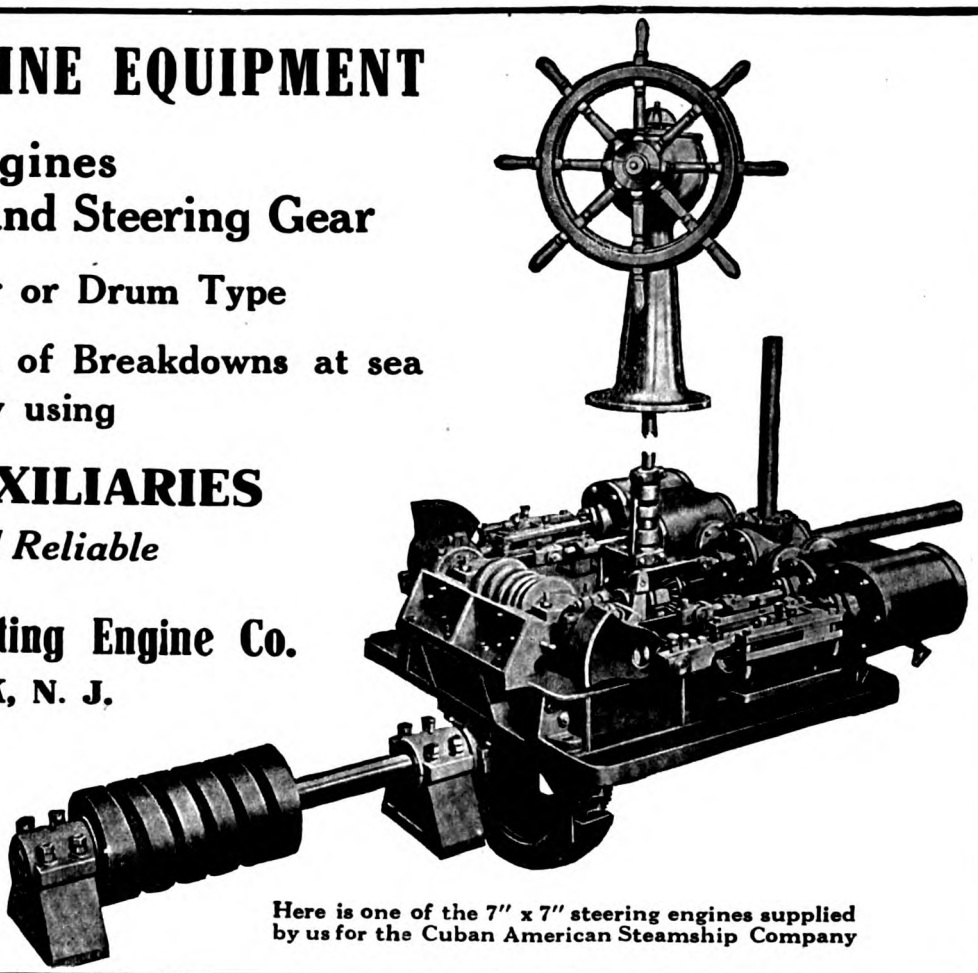

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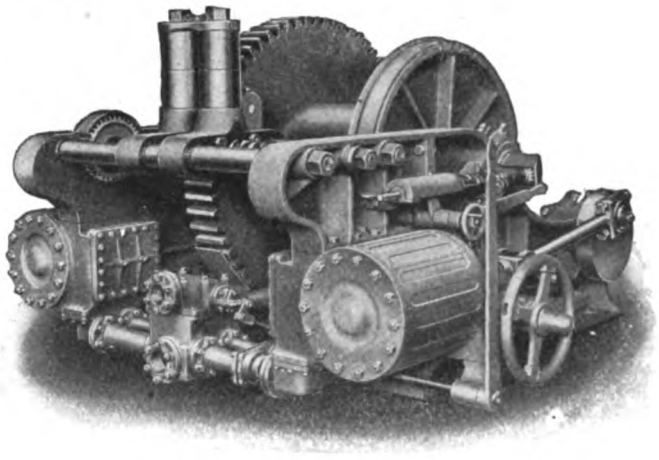

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The saving of 85% in your hawser bill will soon pay for your Philadelphia machine, to say nothing of the saving in time in handling the steel hawsers and in making up tows.

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American Engineering Company
Machinists and Founders
PHILADELPHIA, PA.

LIDGERWOOD WINCHES
"Save Ships' Time in Port"

Illustration shows Single-Keyed Drum, Steam-Reverse-Valve Type of Winch. Installed in pairs at one hatch.

One man controls 2 winches, operating the hatch whip and burton. Quick Starting - Speedy Operation.

Ship and Dock Winches of Every Type **Steering Engines**

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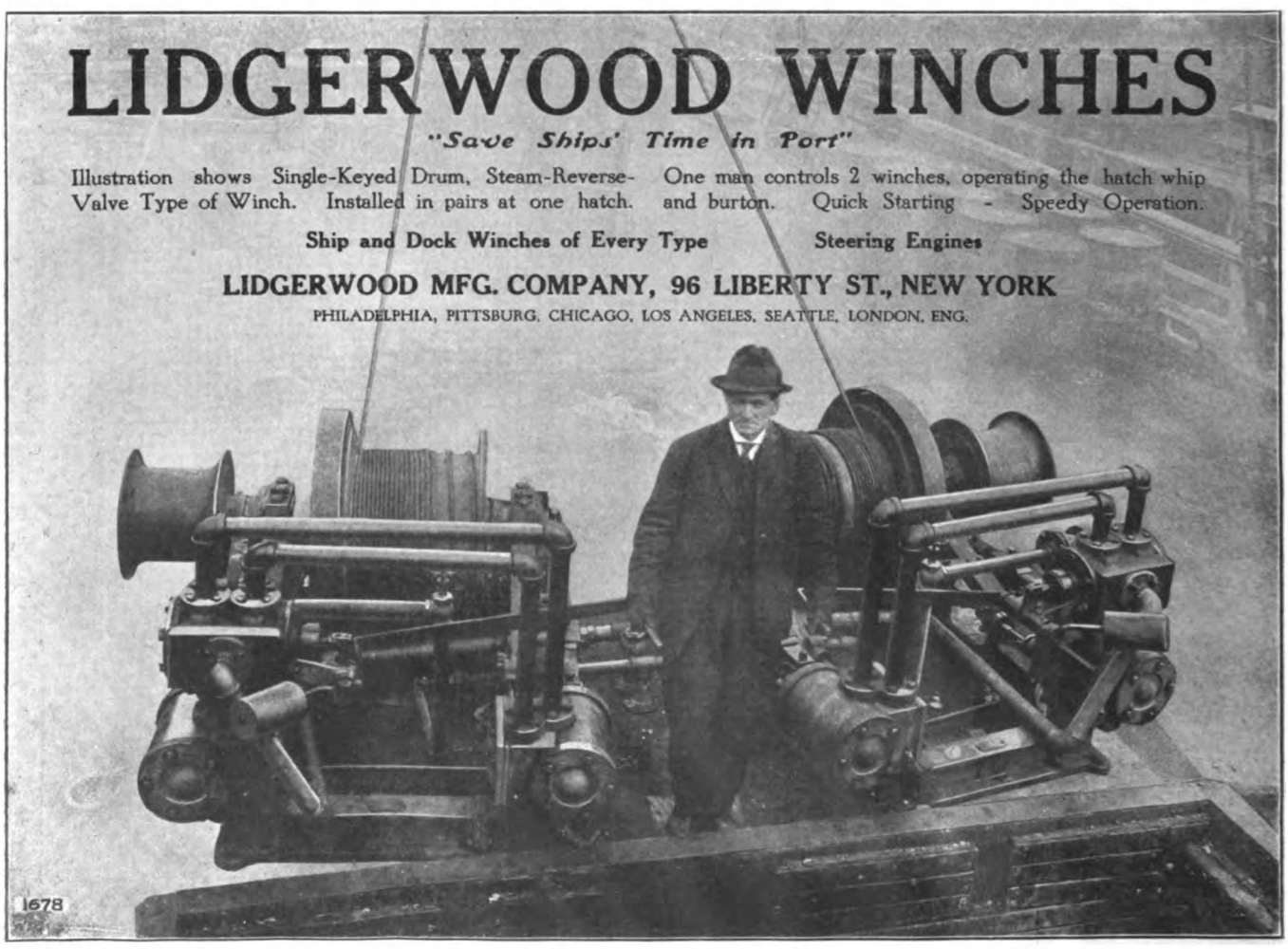

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The "Orleans" was launched on August 22nd by the Thor Iron Works, Toronto, Canada. She is 261 feet long with a carrying capacity of 4300 tons and is equipped with 8680 feet of *Plymouth Rope*. She has three sisters in course of construction; all will be Plymouth equipped.

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NORTH PLYMOUTH, MASS.
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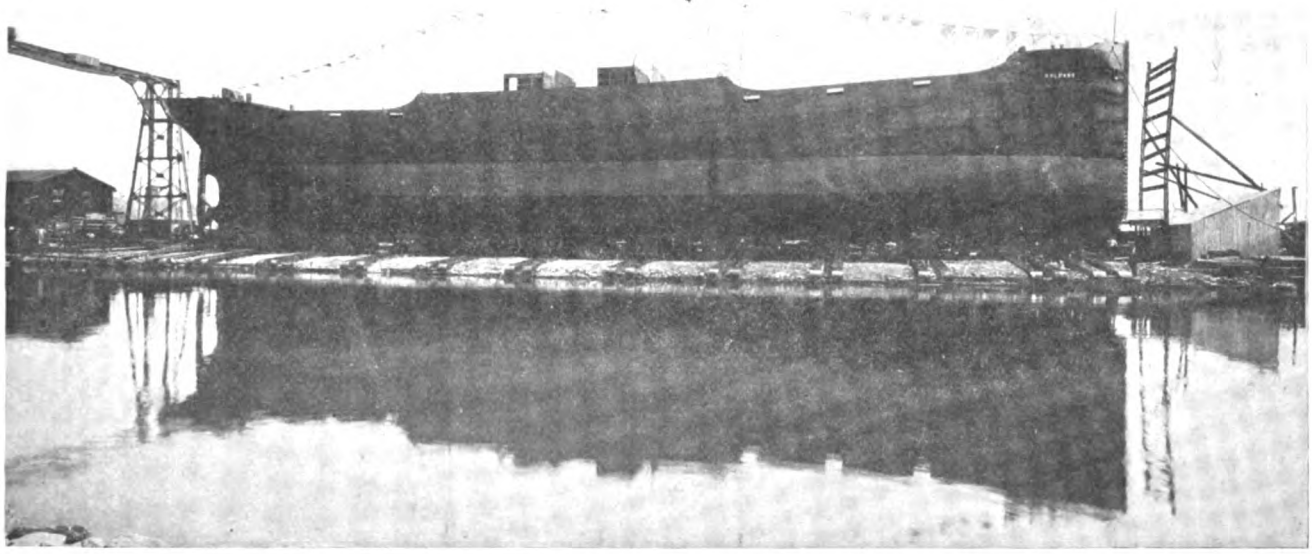

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A Scotch boiler that's cool below the grates is about as efficient as a man with cold feet. *Circulation* and "*pep*" is what they both need.

Eckliffs are *guaranteed* to create and maintain proper circulation in Scotch boilers, and to practically equalize temperatures top and bottom. In Eckliff-equipped boilers *all* of the water is producing steam *all* of the time—and there are no unequal strains on the boilers.

Eckliffs assure *higher* steaming efficiency and *lower* operating expense. Save *now*—write for folder *today*.

J-H Lifeboat Windlasses & Rapid Releasing Hooks

Get rid of the old, time-losing, cumbersome and dangerous blocks and tackles. Equip your vessels with the simplest, surest and *safest* lifeboat-handling devices on the market.

With J-H Windlasses, *two men* can raise the heaviest lifeboat, and *one man* can safely control the descent—either from deck or from the lifeboat. These Windlasses are equipped with *steel cable* only—*no ropes* to kink, rot or burn.

J-H Releasing Hooks *positively insure* the instant and simultaneous release of both ends of lifeboat. Send for illustrated pamphlet *today*.

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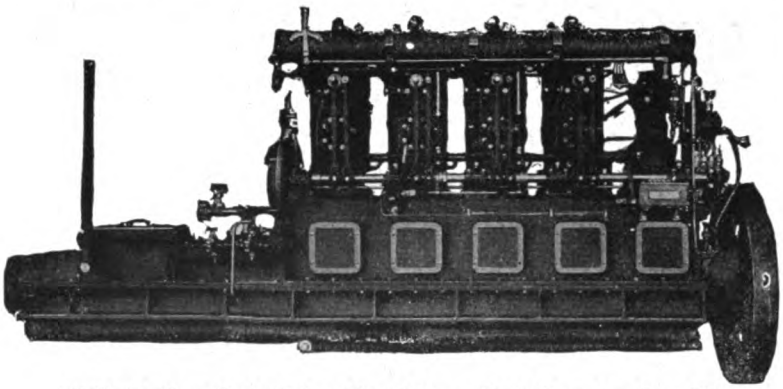

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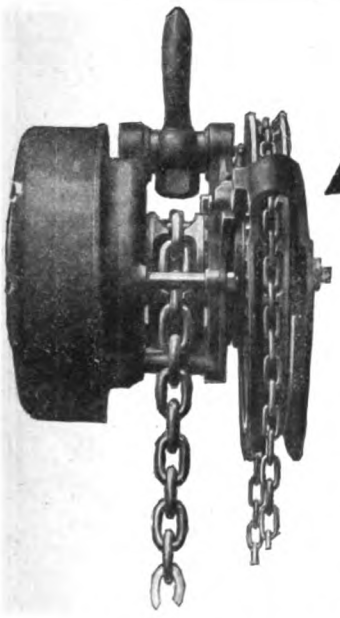

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The Loop Hand Chain Guide Is Patented

THE LOOP Hand Chain GUIDE has proved so effective in increasing Chain Hoist life and decreasing operating troubles that it has become the envy of the trade. For mutual protection know that the LOOP Hand Chain GUIDE is a patented feature that no manufacturer has the right to embody in a chain hoist without license from us.

This guide is an endless steel loop having fixed guiding strips adjacent to the flanges of the wheel, extending from one guide to the other and conforming to the circumference of the wheel. It effectually prevents "gagging" of the hand chain, and damage to the working parts or block and permits rapid travel of the hand chain without over-riding the flange of the hand wheel.

Full particulars in Catalog 3.

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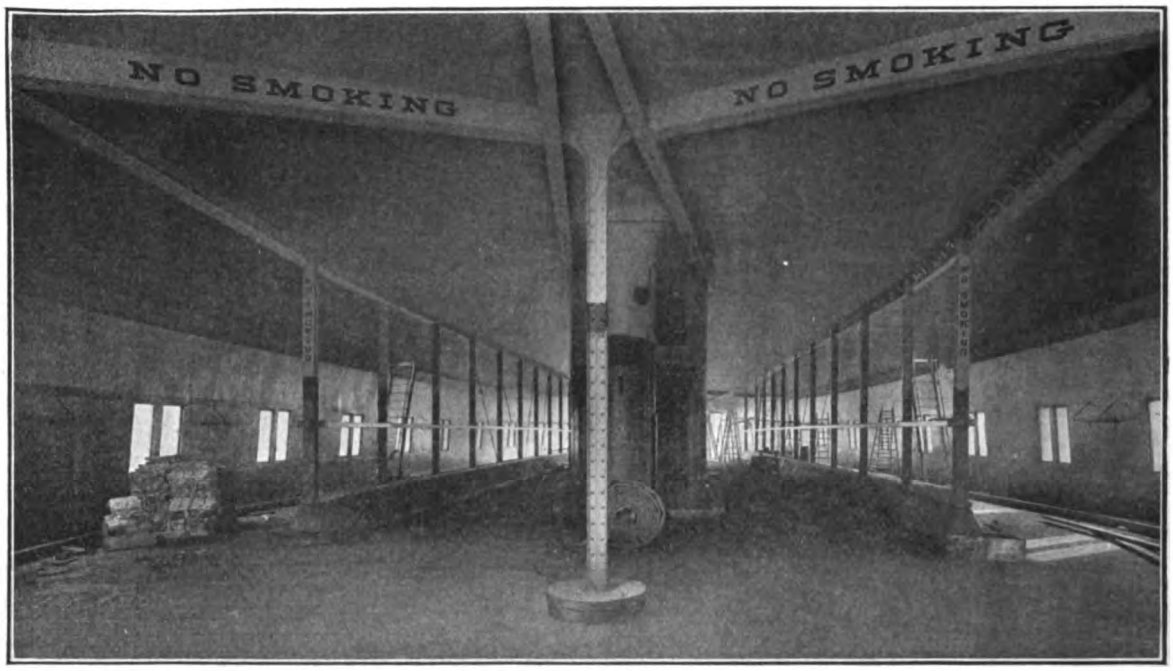

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Adopted by Pennsylvania Railroad Company

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CAPACITY - - - 12 VESSELS PER YEAR

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Branch Offices in New York, Pittsburgh, Chicago, San Francisco, and (Portland, Ore., Colby Eng'r Co.)

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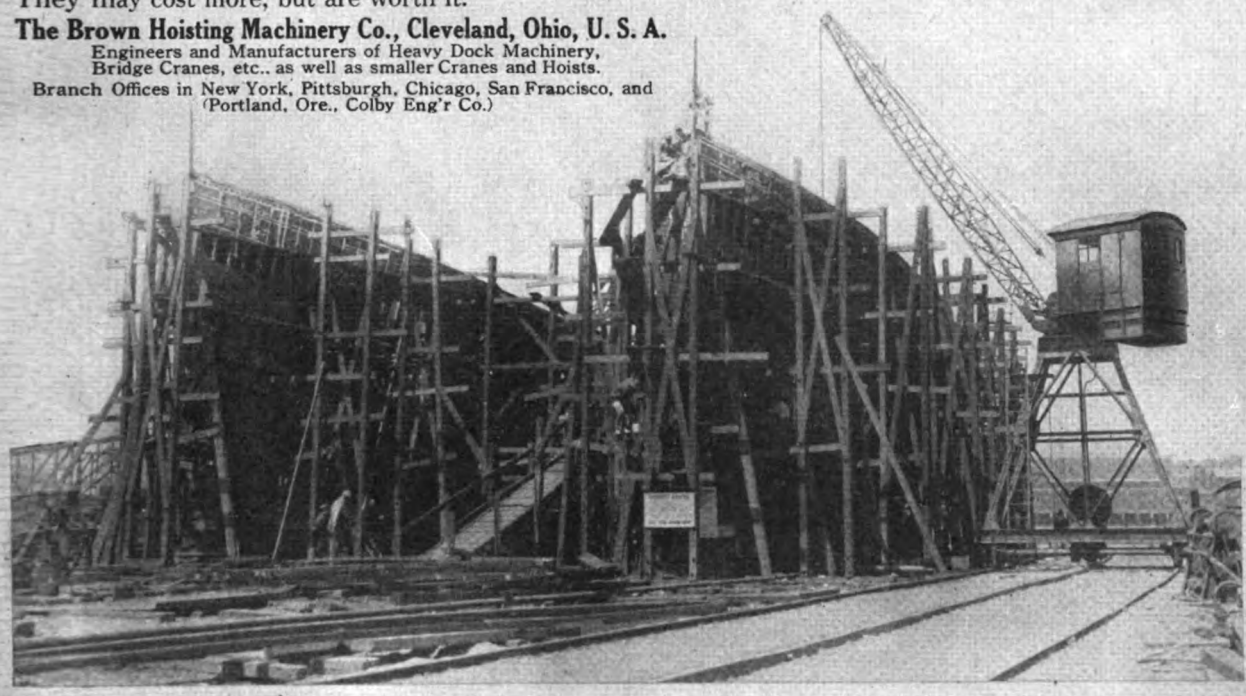
Shipbuilding Cranes



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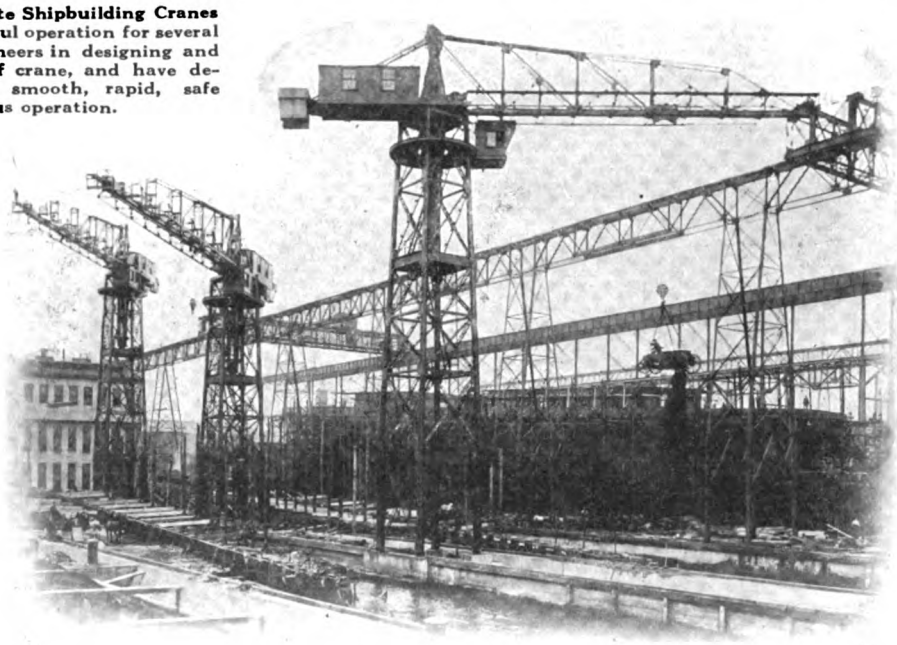
McMyler Interstate Shipbuilding Cranes have been in successful operation for several years. We were pioneers in designing and building this type of crane, and have developed them into smooth, rapid, safe cranes for continuous operation.



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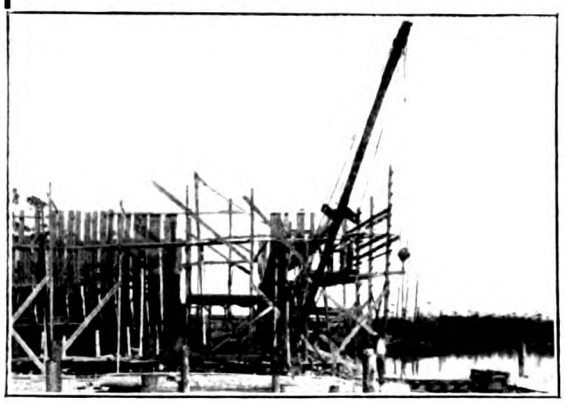
AND SMALL AUXILIARY CRANES FOR CAR UNLOADING AND MATERIAL REHANDLERS FOR LARGER SHIPBUILDERS



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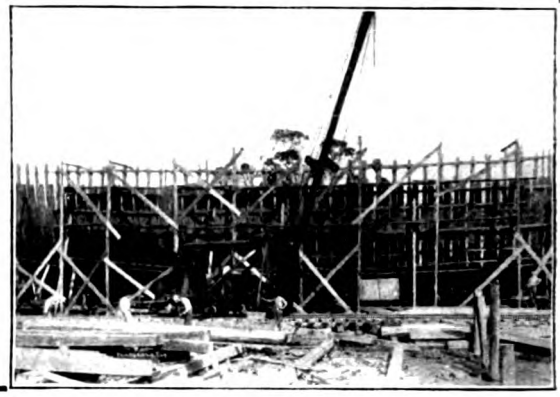

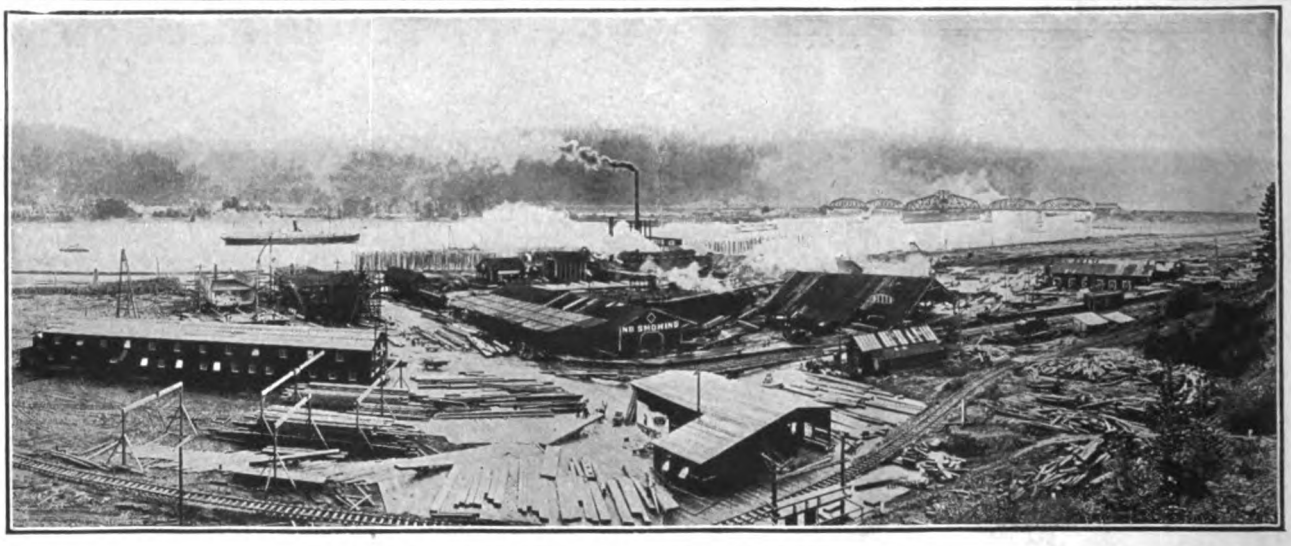

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Our Shipyard has been established at the strategetical point for securing 100% Economy, Efficiency and Speed in Construction of Wooden Ships.

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This coal is marketed under the brand of "Original Pocahontas". The first shipments of coal from the Pocahontas Coal Field were made from the mines of Pocahontas Fuel Company Incorporated, at Pocahontas, Virginia, in 1882, which mines have since continuously mined and are now mining the No. 3 vein and shipping the highest grade of Pocahontas coal.

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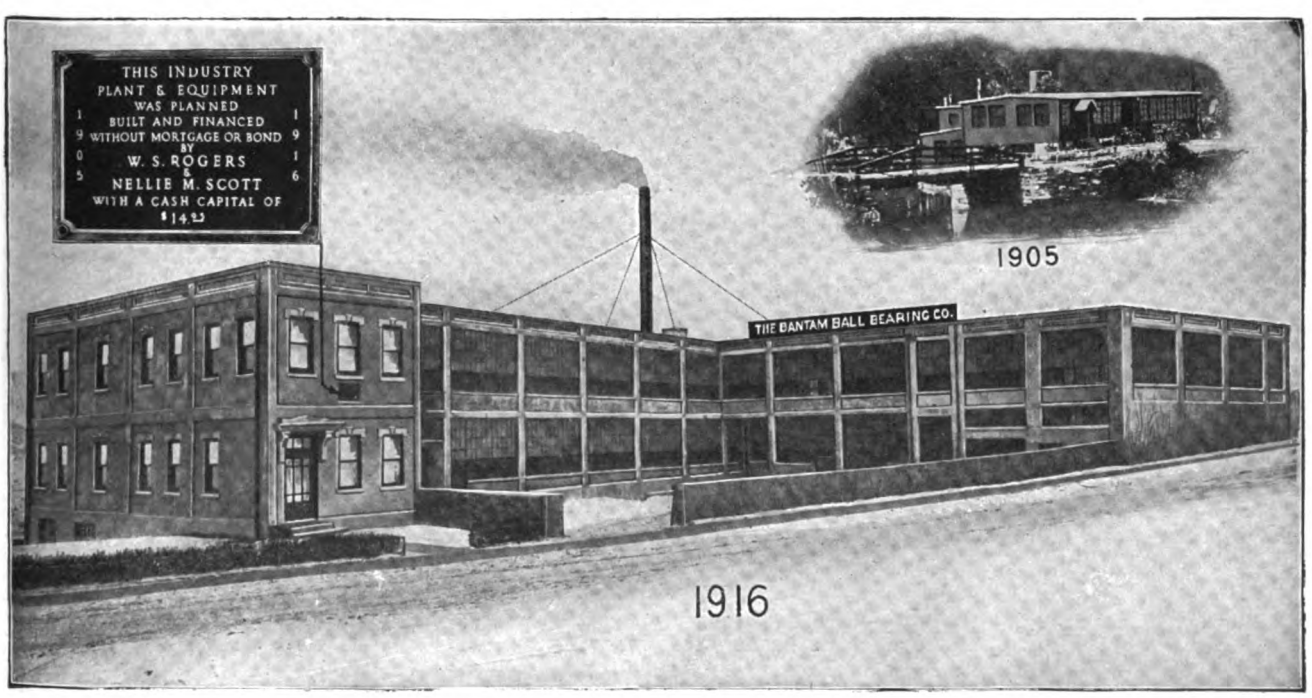

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Ventilation on "Arizona"

"Arizona" the huge oil-burning super-dreadnaught is being served by Sirocco H. V. Fans for hold ventilation.

Nearly fifty fans are required to keep the interior of this mammoth "war dog" in good atmospheric condition.

Our Engineering Department is ever ready to co-operate in the application of Sirocco Products. May we be of service to you.

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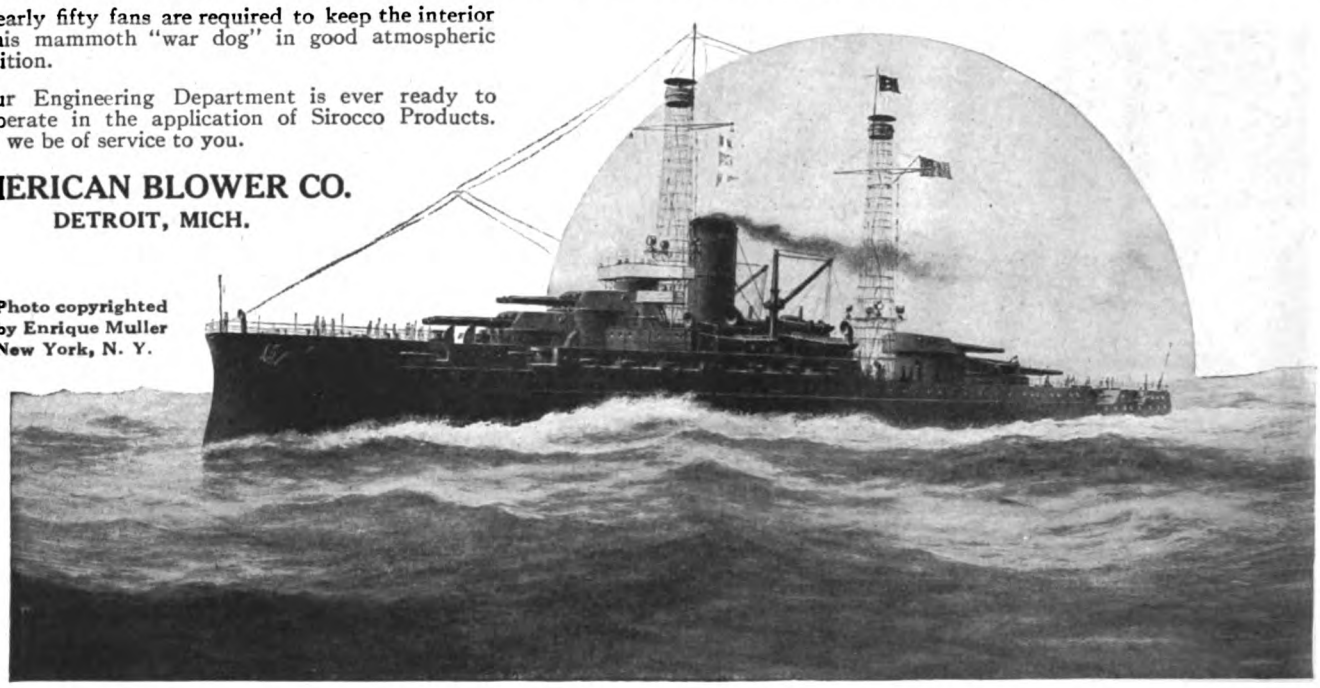

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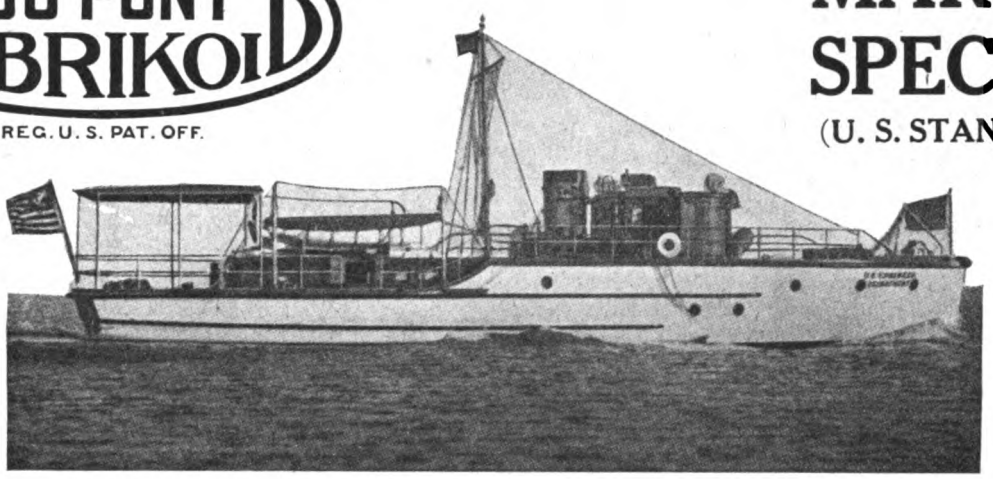

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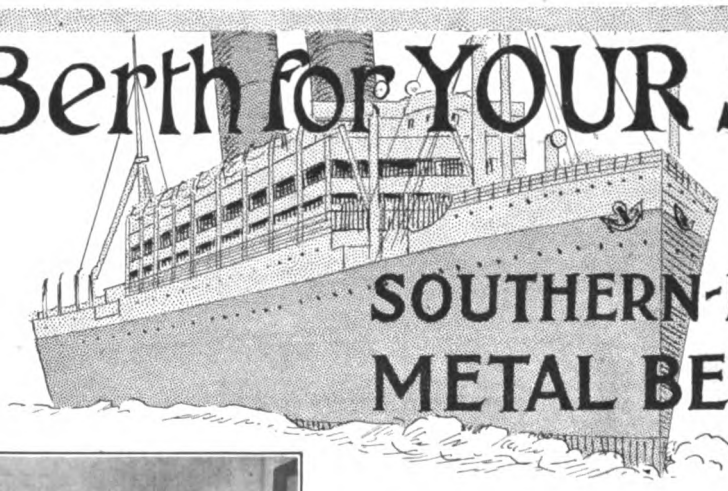

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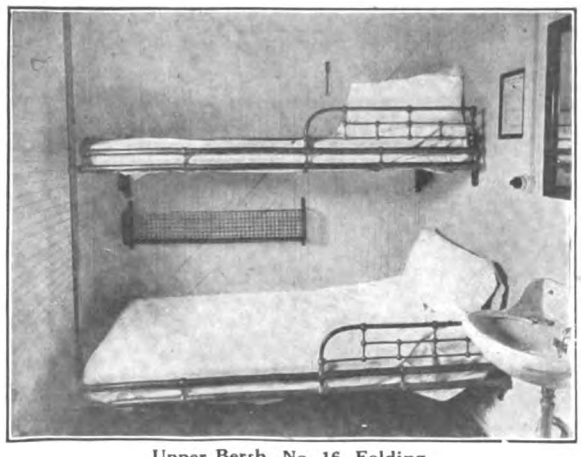

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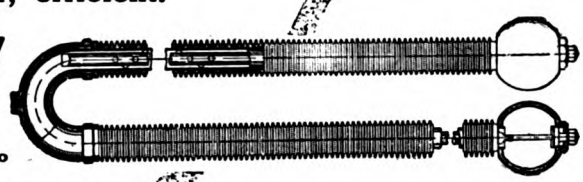

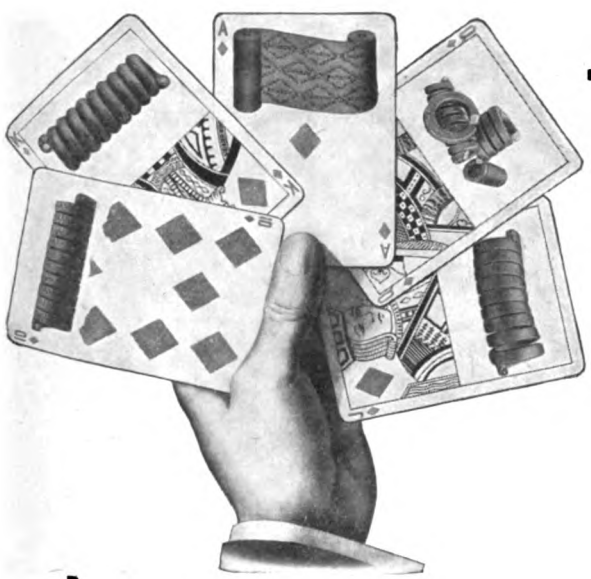

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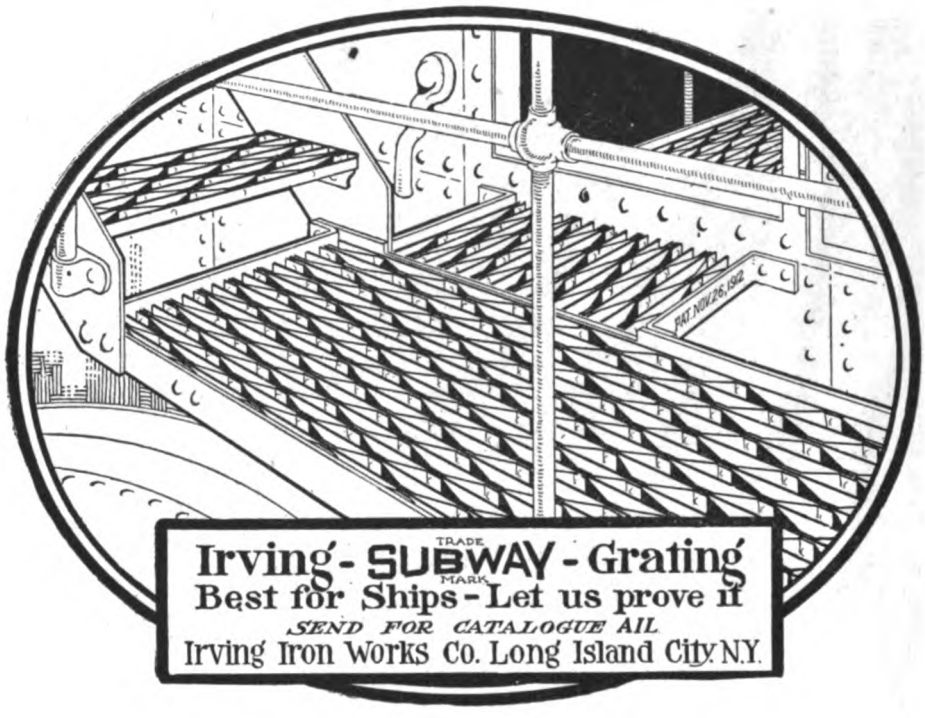
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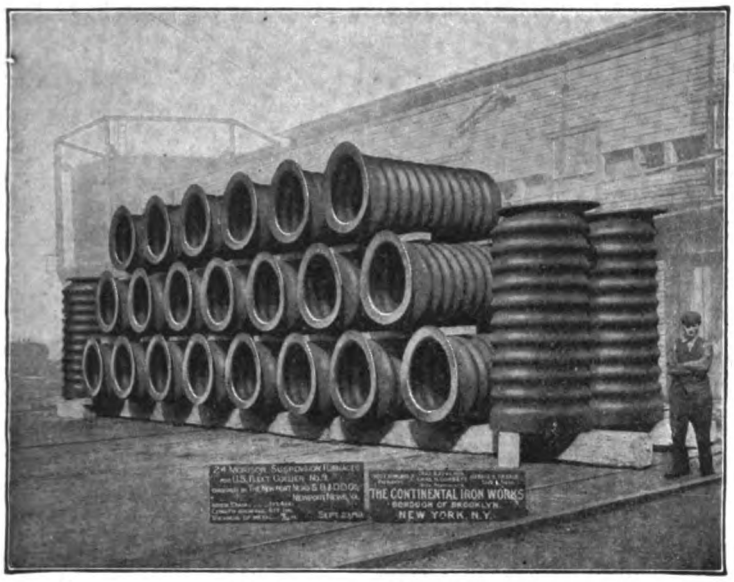

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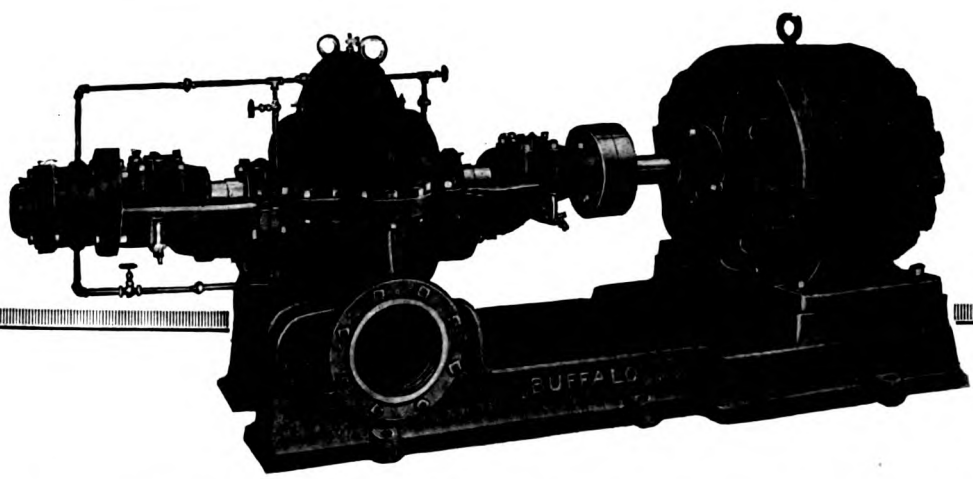

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Buffalo Pumps are built single and multi-stage, with horizontally divided shells, for any conditions desired.

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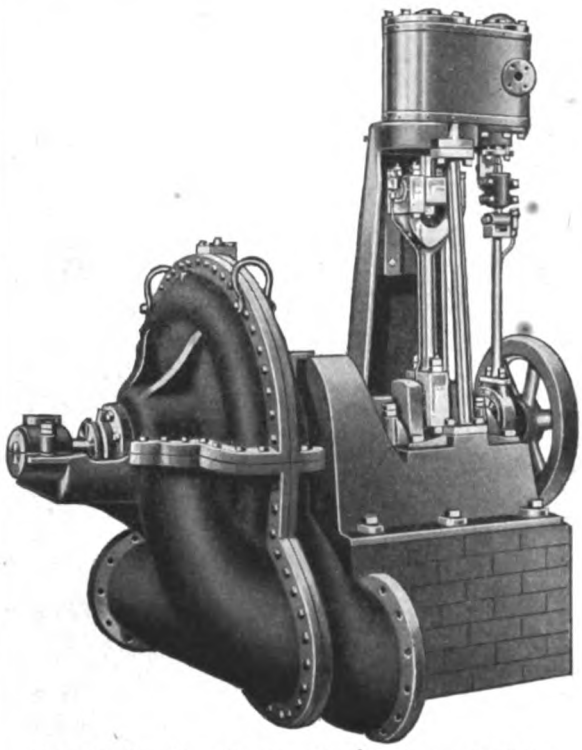

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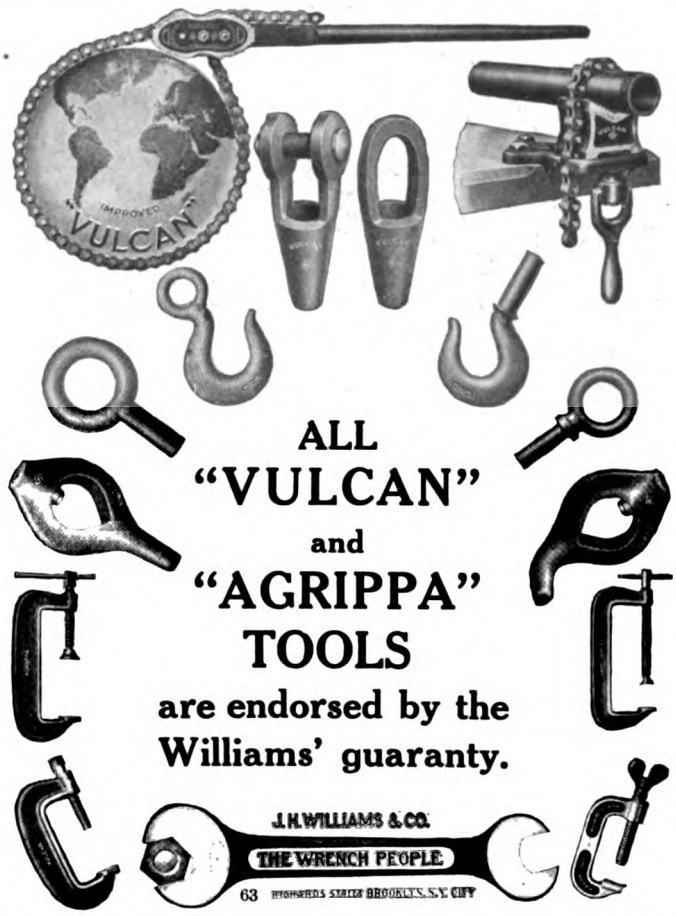

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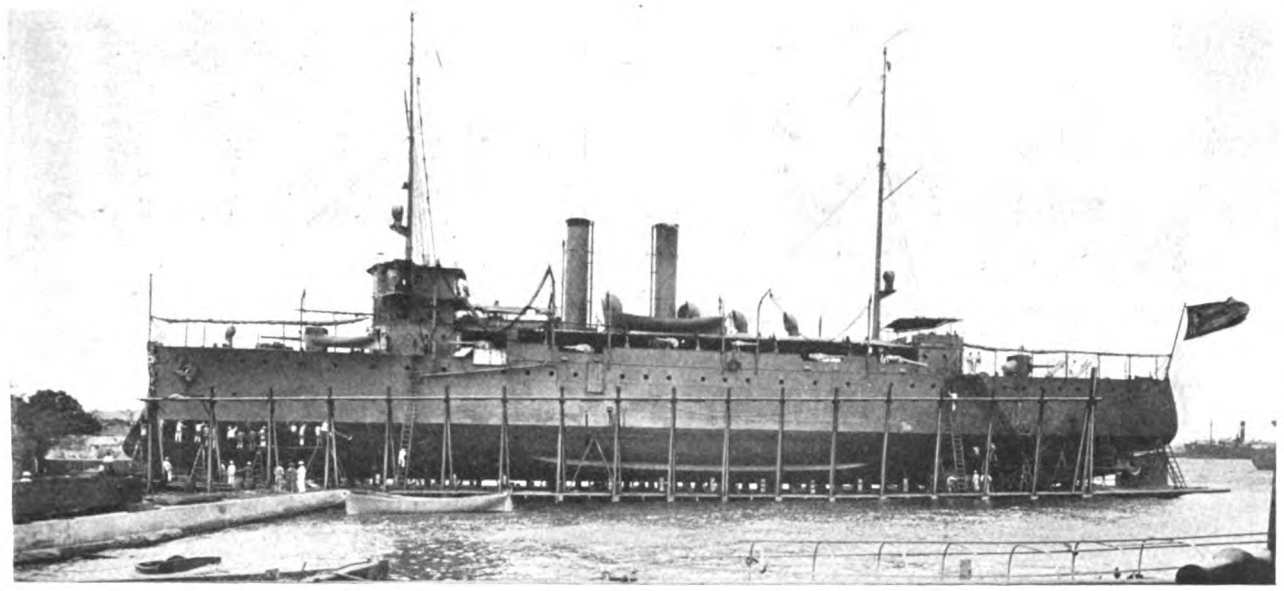

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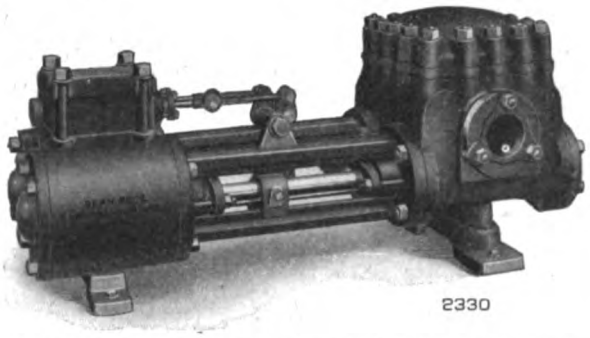

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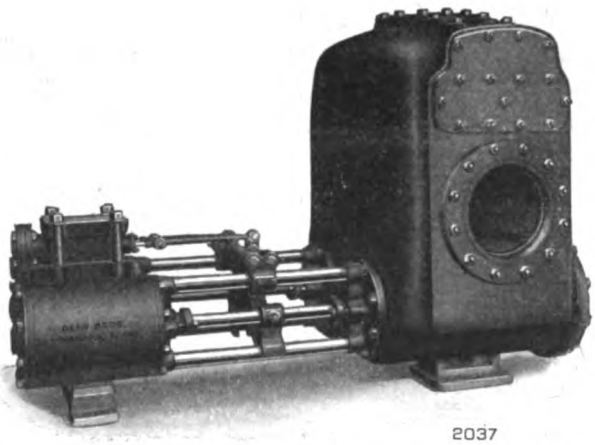

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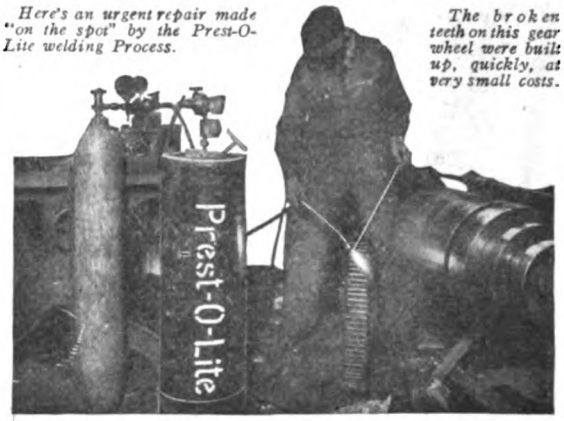
The broken teeth on this gear wheel were built up, quickly, at very small costs.



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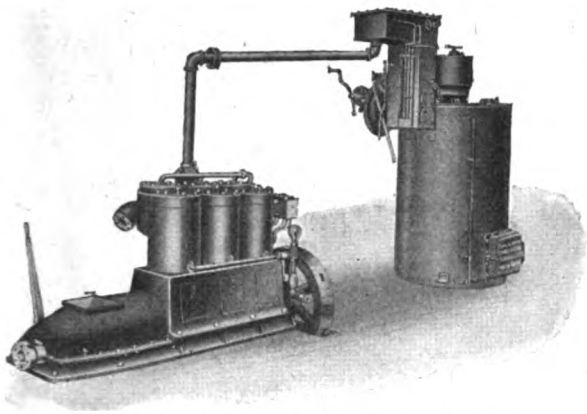

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Saves $540 a Month in Fuel Cost

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Very truly,
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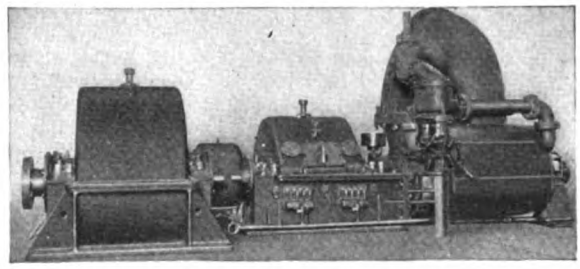

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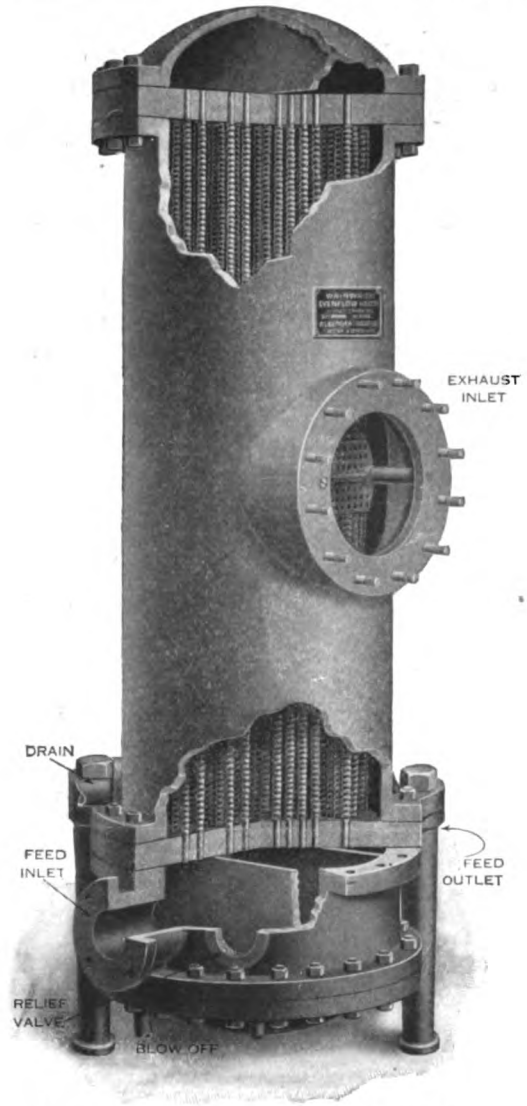

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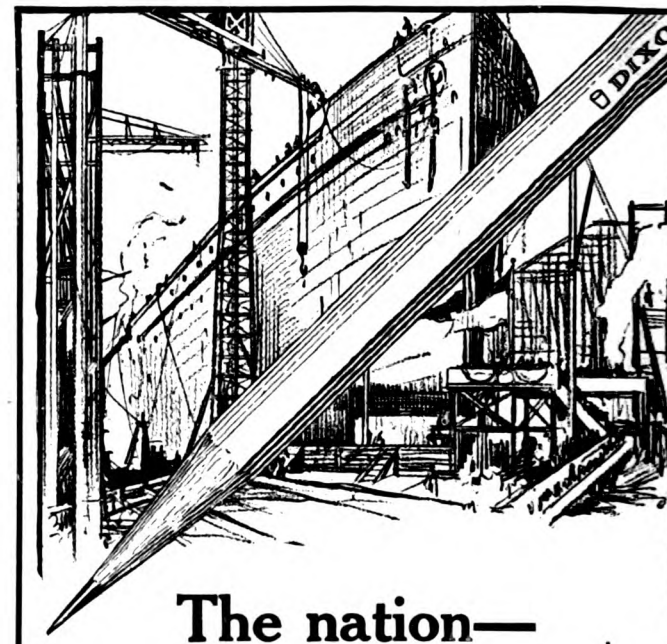

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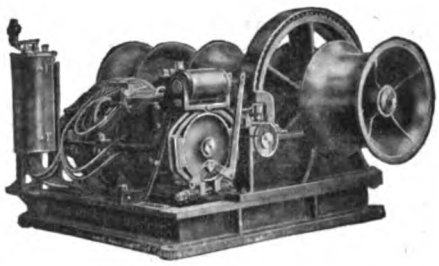

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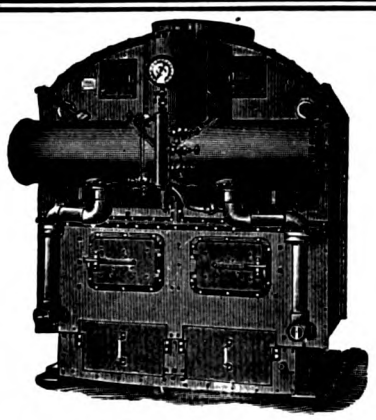

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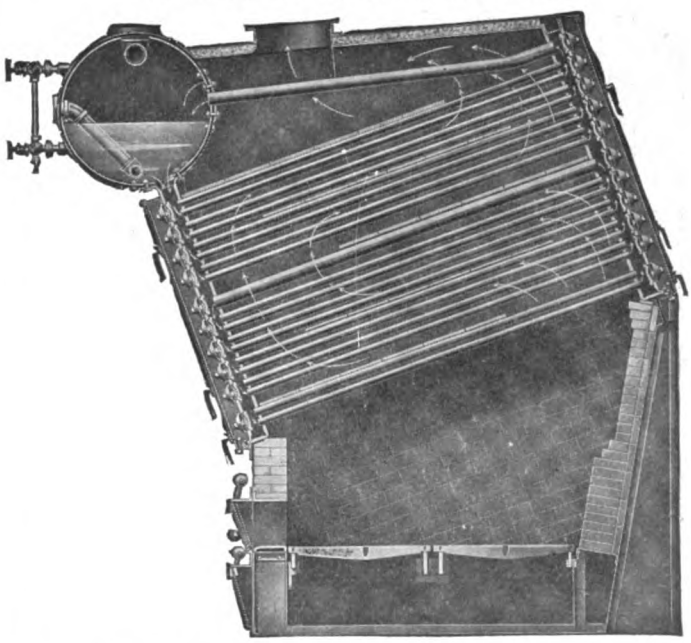

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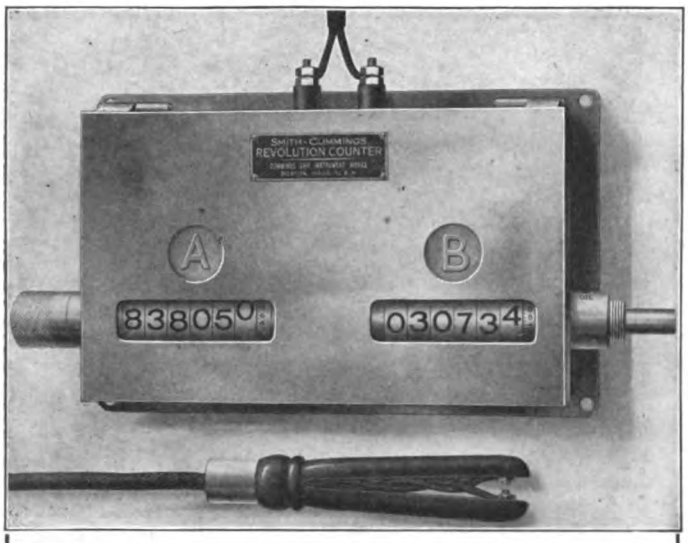

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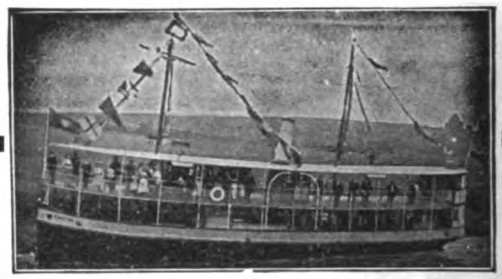

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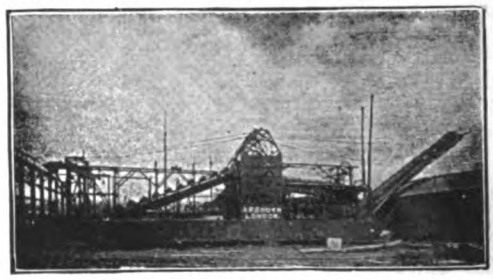

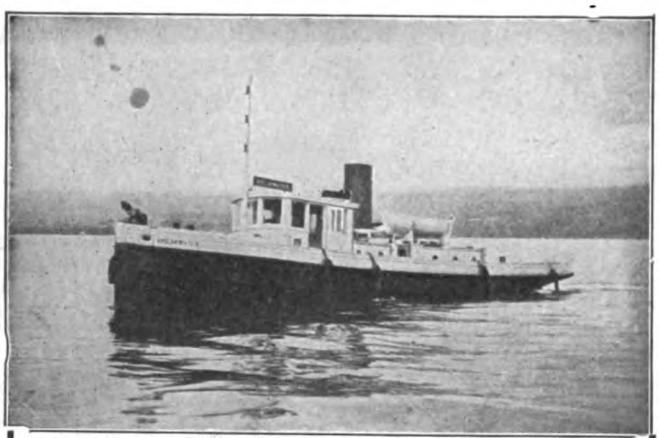

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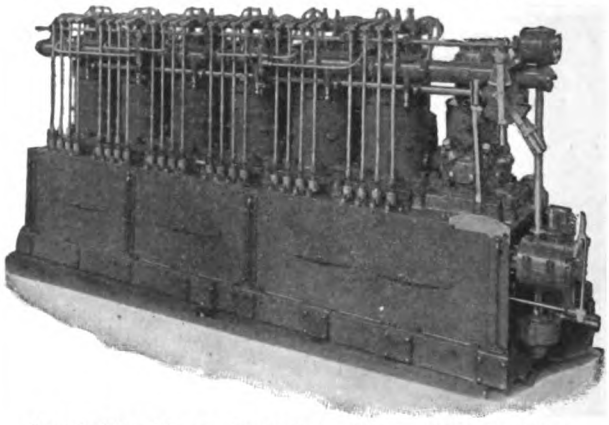

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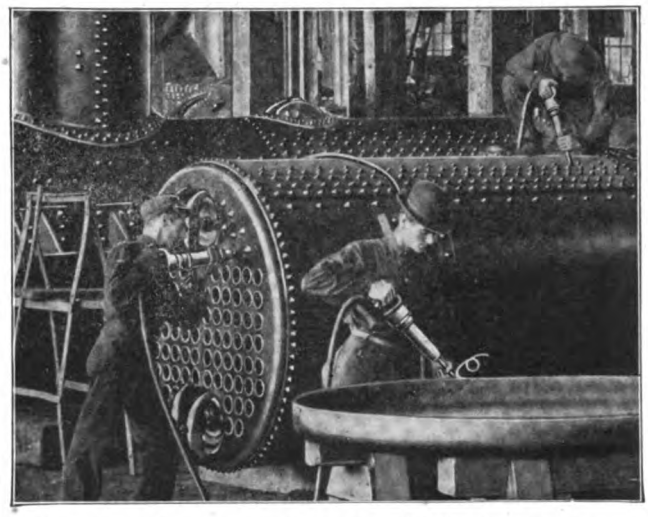

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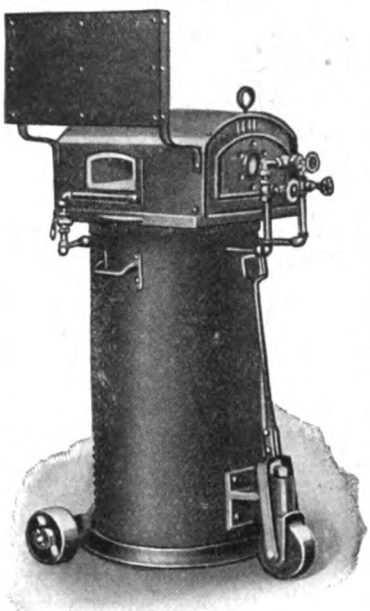

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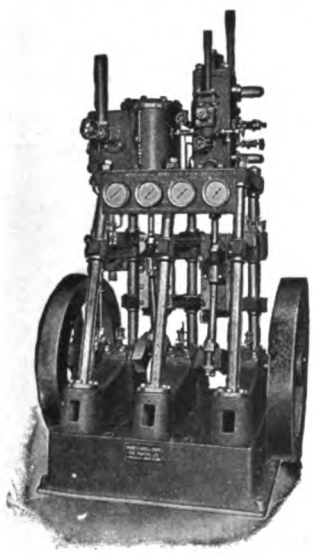

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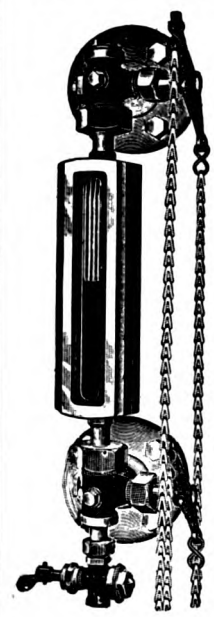

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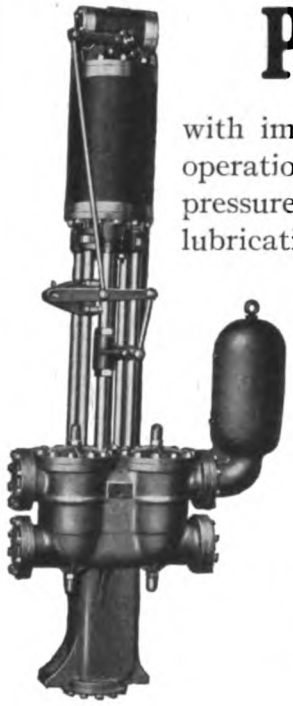

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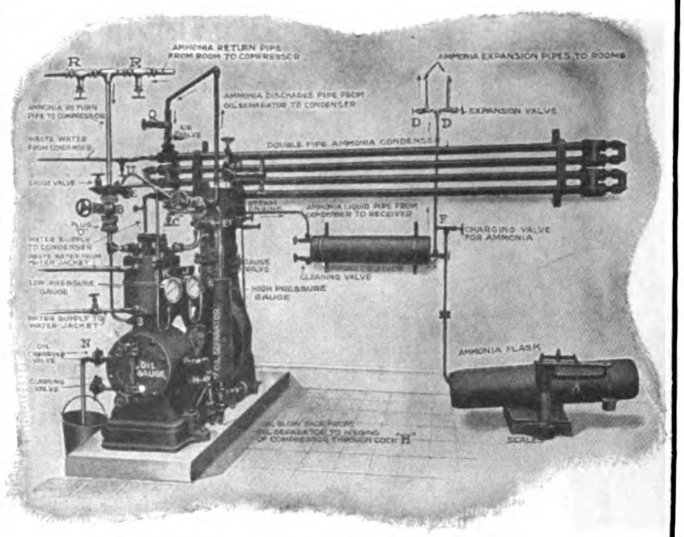
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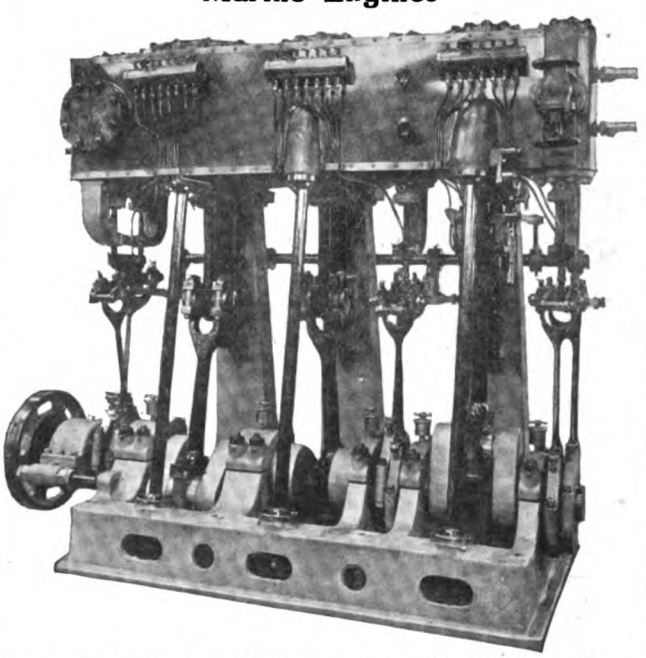

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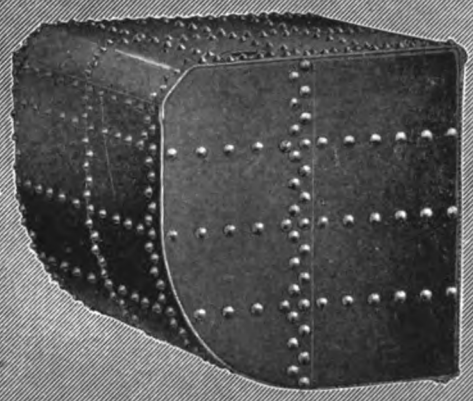

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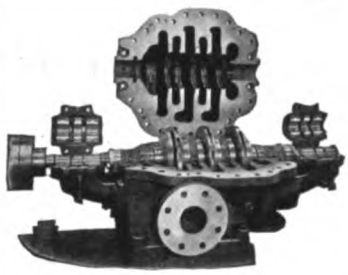

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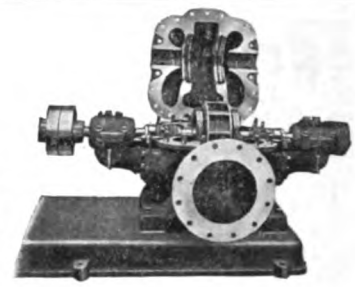

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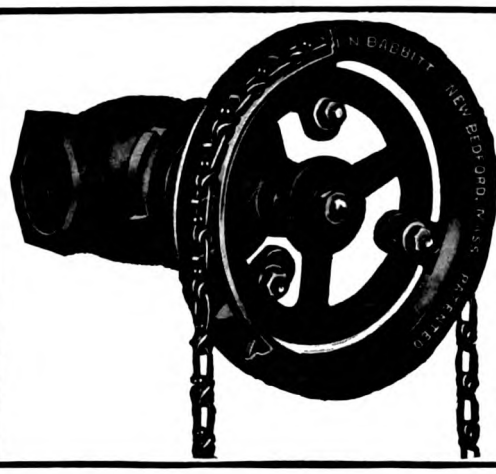

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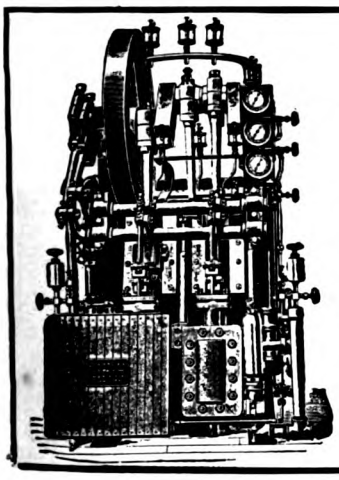

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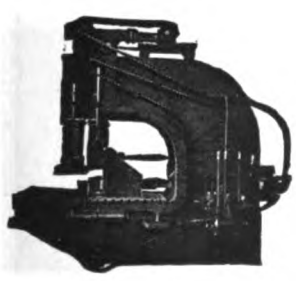

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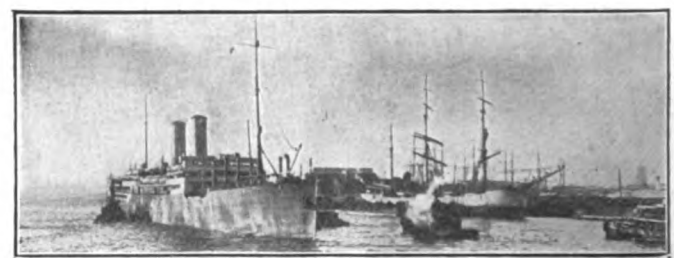

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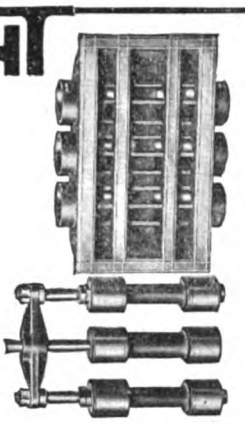

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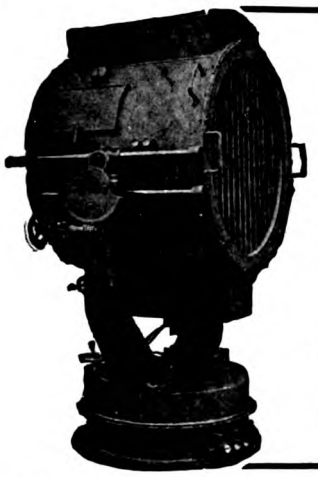

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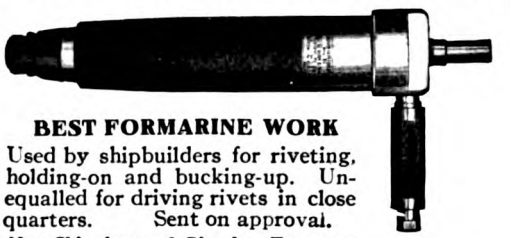

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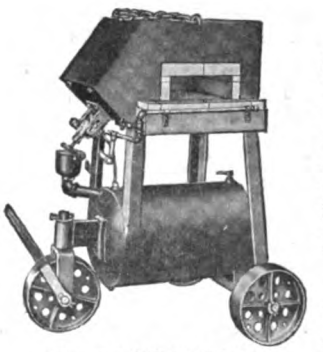

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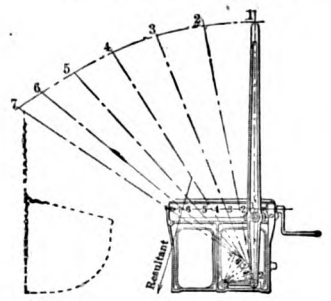

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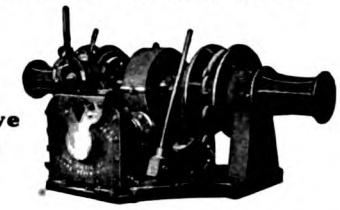

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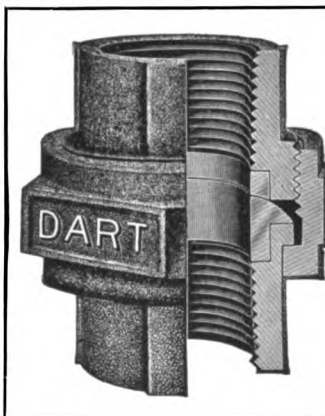

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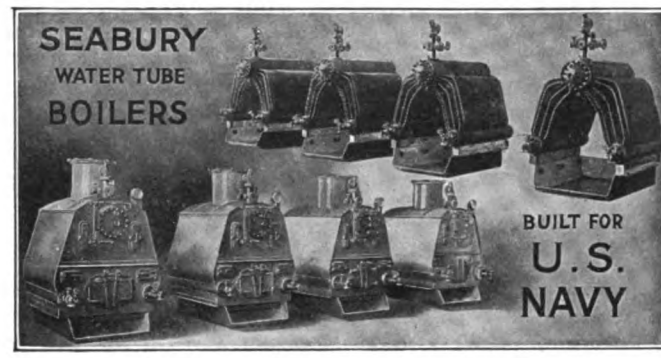

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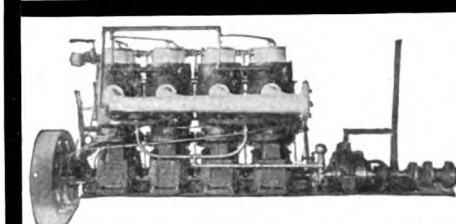

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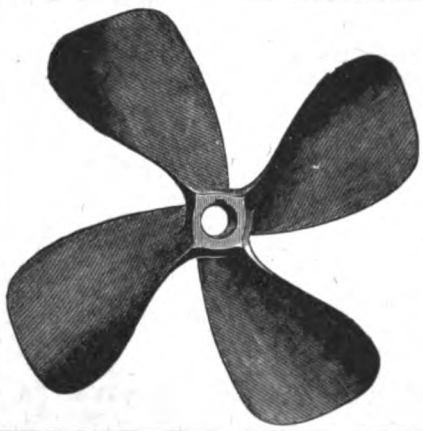

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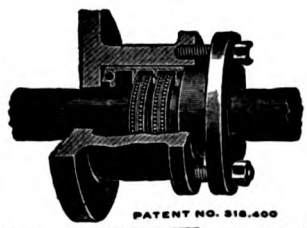

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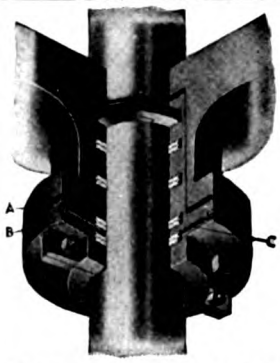

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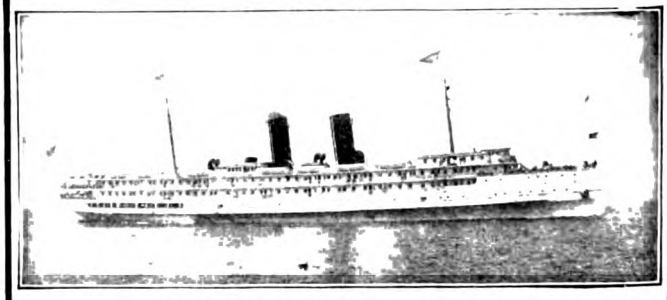

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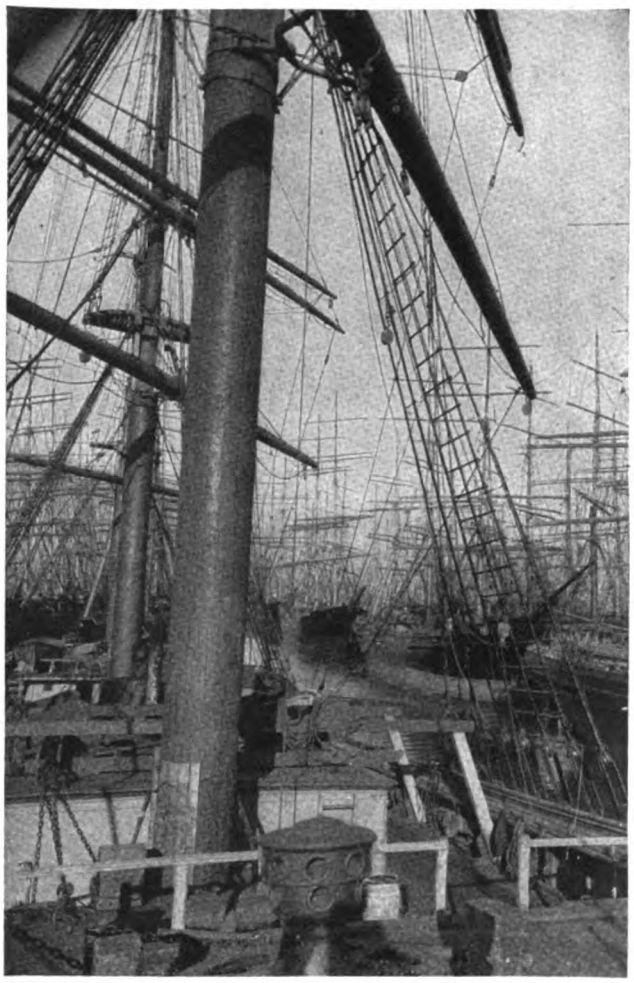

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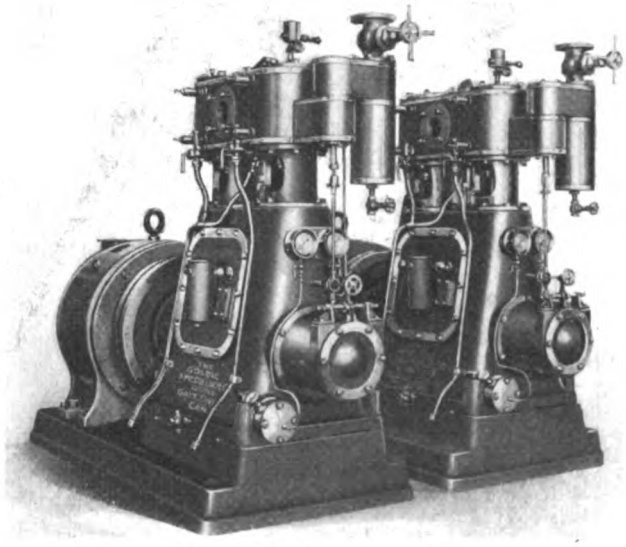

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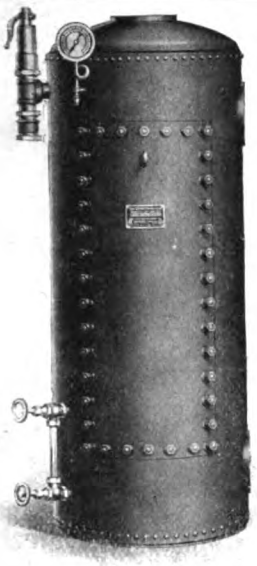

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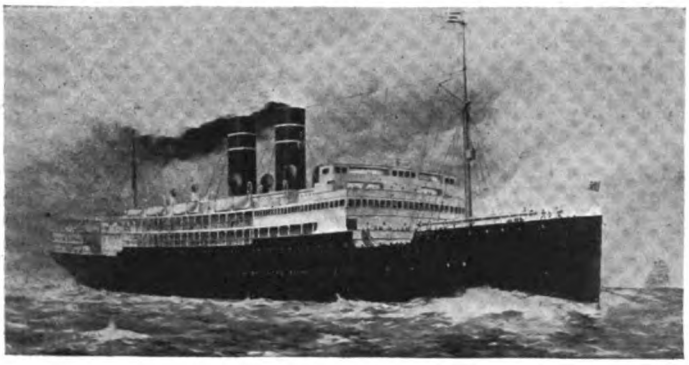

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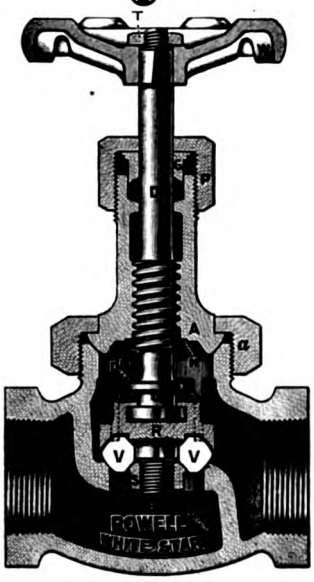

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Mead-Morrison Mfg. Co.
Mundy, J. S., Hoisting Engine Co.
National Hoisting Engine Co.
Otis Elevator Co.
Shepard Elec. Crane & Hoist Co.

Frigidometers.
McNab Co., The.

Frostproof Coverings.
Ferdinand, L. W., & Co.

Fuel Economizers.
Griscom-Russell Co.

Fuel Oil Burners.
Schutte & Körting Co.

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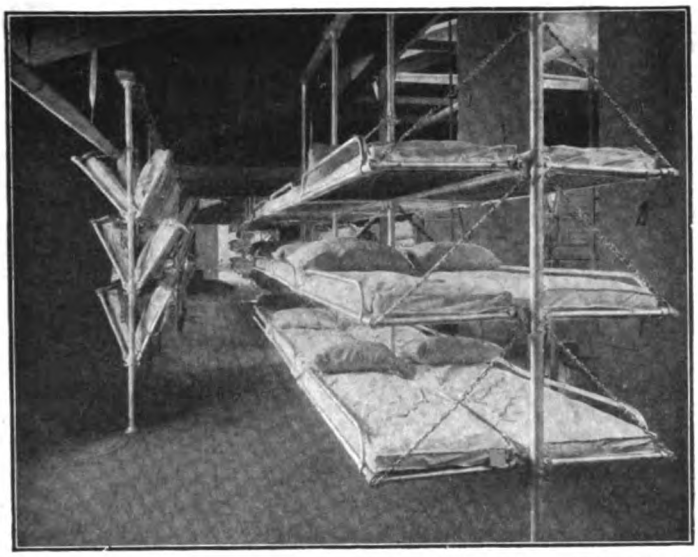
BERNSTEIN METAL BERTHS



Bernstein No. 5550 Folding Berth, installed on U.S.S. "Newark," Providence Harbor.

"STANDEE BERTHS ONE OF OUR SPECIALTIES." We have built them in quantities for the largest shipbuilders in the U. S.

Manufactured in their entirety in a plant which is one of the oldest, largest and best equipped metallic bed and bedding factories in the country.

A complete practical and efficient line is offered. "A berth to successfully meet every condition on board ship." Also brass and iron beds, mattresses and pillows.

We describe them fully in a catalog which should be on your files. WRITE FOR IT — SPECIFYING CATALOG NO. 17.

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Wager, Robert H.

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Continental Iron Works, The.
Fletcher, W. & A., Co.

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Continental Iron Works, The.

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Griscom-Russell Co.
Lunkenheimer Co.
Williams Valve Co., D. T.

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(See Ranges.)

Galvanized Material.
Larkin, J. K., & Co.

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(Also see Packing.)
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Griscom-Russell Co., New York.
Peerless Rubber Mfg. Co.
Smooth-On Mfg. Co.

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Gas Engine & Power Co. and Chas. L. Seabury & Co., Consol.
Remington Oil Engine Co.
Standard Motor Construction Co.
Wolverine Motor Works.

Gas Engine Specialties.
Crane Co.
Kelly & Jones Co.
Lunkenheimer Co.
National Tube Co.
Powell, Wm., Co.
Williams Valve Co., D. T.
Williams, William E.

Gas Producers.

Gate Valves for Tank Steamers.
(Also see Valves.)
Pratt & Cady Co., Inc.

Gauge Cocks.
American Steam Gauge & Valve Mfg. Co.
Jerguson Gage & Valve Co.
Kelly & Jones Co.
Lunkenheimer Co.
Powell, Wm., Co.
Pratt & Cady Co., Inc.
Williams Valve Co., D. T.
Williams, William E.

Gauges.
(See Steam Gauges.)

Gauge Glasses.
Crane Co.
Jerguson Gage & Valve Co.
Lunkenheimer Co.
Williams Valve Co., D. T.
Williams, William E.

Gauge Testers.
American Steam Gauge & Valve Mfg. Co.

Gears.
De Laval Steam Turbine Co.
Link-Belt Co.
Westinghouse Electric & Mfg. Co.

Generating Sets.
Engberg's Electrical & Mechanical Works.
General Electric Co.
MacGovern & Co.
Remington Oil Engine Co.
Terry Steam Turbine Co.
Westinghouse Electric & Mfg. Co.

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(See Electric Plants.)

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Glue.
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Dixon, Jos., Crucible Co.

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Irving Iron Works Co.

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Crane Co.
Griscom-Russell Co.
Lunkenheimer Co.

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American Steam Gauge & Valve Mfg. Co.
Griscom-Russell Co.
Row & Davis, Engineers, Inc.

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Independent Pneumatic Tool Co.

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(See Pneumatic Tools.)

Hammers, Power.
Beaudry & Co., Inc.
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Hammers, Steam.
(See Steam Hammers.)

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(See Couch Hammocks.)

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Plymouth Cordage Co.
Waterbury Co.
Whitlock Cordage Co.

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Magnesia Association of America.

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Kearfott Engineering Co.
Mott Iron Works, J. L.
Sands, A. B., & Son Co.
Schutte & Körting Co.
Sturtevant Co., B. F.

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American Blower Co.
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Dake Engine Co.
Hyde Windlass Co.
Lidgerwood Mfg. Co.
Mead-Morrison Mfg. Co.
Mundy, J. S., Hoisting Engine Co.
National Hoisting Engine Co.

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(See Rope.)

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(See Chain Hoists.)

Hoists, Electric.
(See Electric Hoists.)

Horizontal Punches.
Covington Machine Co.

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(Also see Air Hose.)
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Independent Pneumatic Tool Co.
Oldham, Geo. & Son Co.

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Chicago Pneumatic Tool Co.
Cleveland Pneumatic Tool Co.
Independent Pneumatic Tool Co.
Oldham, Geo., & Son Co.

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Morse, Andrew J., Son, Inc.

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Griscom-Russell Co.

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Lunkenheimer Co.
National Tube Co.
Powell, Wm., Co.
Schutte & Körting Co.

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Chambersburg Engineering Co.
Niles-Bement-Pond Co.

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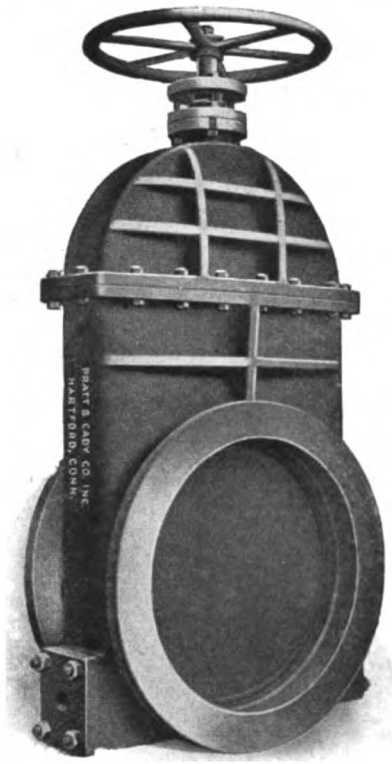

Pratt & Cady Double Disc Parallel Seat Gate Valve with Cleanout.

Gate Valves for Tank Steamers

This is an illustration of a Pratt and Cady, Double Disc, Parallel Seat, Gate Valve with a Clean-out especially adapted for oil lines in Tankers.

The double disc construction, with a wedging mechanism between the discs, insures a positively tight joint.

They are made either of all iron, or with an iron body and bronze spindles, bronze seat rings and bronze disc faces, in all the sizes required for this service.

Ask us for further particulars of why they give perfect satisfaction on oil-carrying vessels.

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Hartford, Conn.

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International Oxygen Co.

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McNab Co., The

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Indicator Connections.
Lunkenheimer Co.

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Ashton Valve Co.
Lunkenheimer Co.
Manning, Maxwell & Moore.
Powell Co., The, William.

Induced Draft.
American Blower Co.

Injectors.
Lunkenheimer Co.
Manning, Maxwell & Moore.
Powell Co., The, William.
Schutte & Körting Co.

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Griscom-Russell Co.

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Asbestos Protected Metal Co.

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Columbian Rope Co.

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Remington Oil Engine Co.
Standard Motor Construction Co.
Wolverine Motor Works.

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Irving Iron Works Co.

Ladder Treads.
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International Compositions Co.

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General Electric Co.

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Asbestos Protected Metal Co.

Lath, Metal.
Asbestos Protected Metal Co.

Lathes, Crank Shaft.
Niles-Bement-Pond Co.

Lathes, Engine.
Niles-Bement-Pond Co.

Lathes, Turret.
Niles-Bement-Pond Co.

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California Shipbuilding Co.
Gas Engine & Power Co. and Chas. L. Seabury & Co., Consol.
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New London Ship & Engine Co.
Peninsula Shipbuilding Co.
Standard Motor Construction Co.
Sun Shipbuilding Co.
Valk & Murdoch Co.
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Welin Marine Equipment Co.
Wolverine Motor Works.

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Sands, A. B., & Son Co.
Williams, William E.

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Griscom-Russell Co.
Schutte & Körting Co.

Lead Pencils.
(See Pencils.)

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Galbraith, C. C., & Son.
Lane Life Boat Co., C. M.
Welin Marine Equipment Co.
Williams, William E.

Life Preservers.
Ferdinand, L. W., & Co.
Galbraith, C. C., & Son.
Welin Marine Equipment Co.
Williams, William E.

Life-Saving Devices.
Galbraith, C. C., & Son.
Steward Davit & Equipment Corp.
Welin Marine Equipment Co.
Williams, William E.

Lines—Towing, Buoy
(See Rope.)

Liquid Glue, Waterproof.
Ferdinand, L. W., & Co.

Loading and Unloading Equipment.
(See Freight Handling Equipment.)

Locomotive Cranes.
(See Cranes.)

Log Registers.
Cummings Ship Instrument Wks.
McNab Co., The.
Welin Marine Equipment Co.

Lubricants.
Albany Lubricating Co.
Dixon, Jos., Crucible Co.
Sun Co.
Williams, William E.

Lubricating Compound.
Albany Lubricating Co.
Sun Co.
Williams, William E.

Lubricating Oil.
Sun Co.

Lubricators.
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Crane Co.
Griscom-Russell Co.
Kelly & Jones Co.
Lunkenheimer Co.
Powell, Wm., Co.
Schutte & Körting Co.
Sun Co
Williams Valve Co., D. T.
Williams, William E.

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Long-Bell Lumber Co.
Southern Pine Association.

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(See Tools, Machine.)

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(See Second Hand Machinery.)

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Hyde Windlass Co.
Lunkenheimer Co.

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Magnesia Association of America.

Manila and Sisal Rope.
(See Rope.)

Marine Cableways.
Lidgerwood Mfg. Co.

Marine Electrical Equipment
(See Elecrical Fittings and Supplies.)

Marine Castings.
(See Castings—Marine.)

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(See Engines, Propelling.)

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(See Engineers, Consulting.)

Marine Forgings.
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Griscom-Russell Co.
Williams, William E.

Marine Heaters.
(See Heating & Ventilating Apparatus.)

Marine Lamps.
(See Lamps.)

Marine Paint.
(Also see Paint.)
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International Compositions Co.
Murphy Varnish Co.

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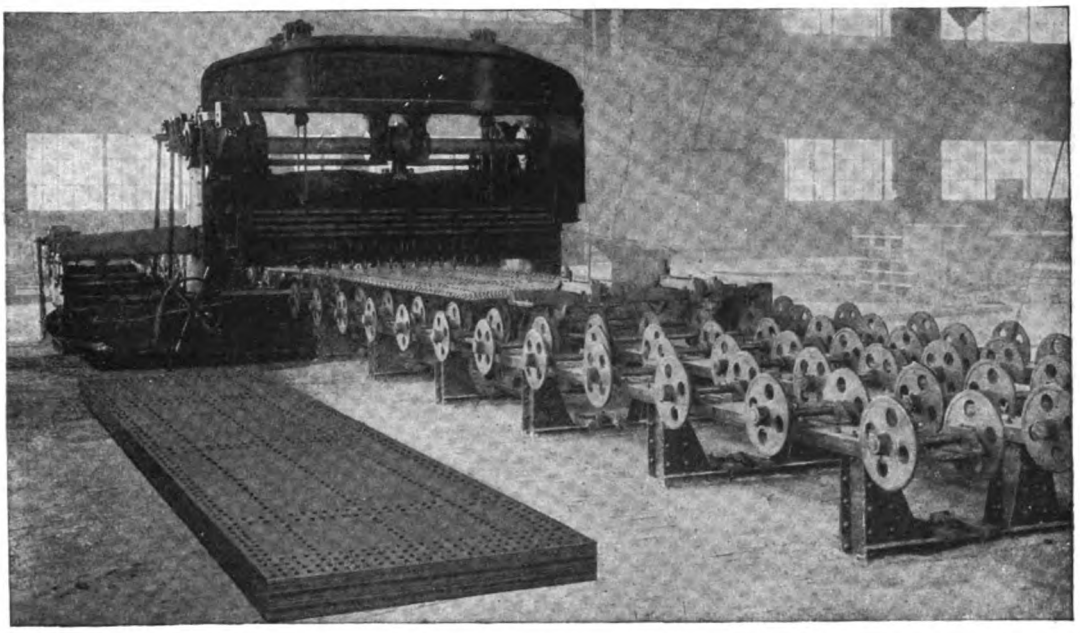

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General Electric Co.
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Hyde Windlass Co.
Lidgerwood Mfg. Co.
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Mundy, J. S., Hoisting Engine Co.
National Hoisting Engine Co.

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Central Foundry Co.

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Motor Boat Supplies.
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General Electric Co.

Motors, Gasoline.
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Thomas Spacing Mch. Co.

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(See Professional Cards.)

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(See Valves.)

Nipples.
Crane Co.
National Tube Co.

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Magnesia Association of America.
Williams, Wm. E.

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(See Hose Nozzles.)

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(See Bolts and Nuts.)
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Oakum.
Galbraith, C. C., & Son.
Stratford Oakum Co., George.
Welin Marine Equipment Co.

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(See Lubricants.)

Oil Burners, Fuel.
(See Fuel Oil Burners.)

Oil Coolers.
(See Multiwhirl Oil Coolers.)

Oil Cups.
(See Lubricators.)

Oil Engines.
(See Engines, Oil.)

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Schutte & Körting Co.
Williams, William E.

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American Shop Equipment Co.
Beach-Russ Co.
Mahr Mfg. Co.
Metals Production Equipment Co.

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Row & Davis.

Oil Gauges.
Crane Co.
Lunkenheimer Co.
Powell Co., The.
Williams, William E.

Oil Pumps.
Lunkenheimer Co.
Williams, William E.

Oil Tanks.
(See Fuel Oil Tanks.)

Oiling Systems.
(Also see Lubricators.)
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Lunkenheimer Co.
Powell Co., Wm.
Schutte & Körting Co.
Sun Co.
Williams, William E.

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Brown Hoisting Machinery Co.
Byers Machine Co., John F.
Dravo-Doyle Co.
Link-Belt Co.
McMyler-Interstate Co., The.
Mead-Morrison Mfg. Co.
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National Hoisting Engine Co.
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International Oxygen Co.
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France Packing Co.
Greene, Tweed & Co.
Holmes Metallic Packing Co.
Martell Packings Co.
Peerless Rubber Mfg. Co.
Quaker City Rubber Co.
U. S. Metallic Packing Co.
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Packing, Asbestos.
Crane Co.
Williams, William E.

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International Compositions Co.
Williams, William E.

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Keyes Products Co.
Marine Decking & Supply Co.

Partitions.
(Marine Fireproof.)
Keyes Products Co.
Marine Decking & Supply Co.

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(See Attorneys, Patent.)

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Dixon Crucible Co., Joseph.

Phosphor Bronze Castings.
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Hyde Windlass Co.
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Lunkenheimer Co.
National Tube Co.
Powell Co., The, Wm.
Williams Valve Co., D. T.
Williams, William E.

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Coes Wrench Co.
Greene, Tweed & Co.
Williams & Co., J. H.
Williams, William E.

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Dixon, Jos., Crucible Co.

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Sun Co.

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(See Pneumatic Tools.)

Pneumatic Hammers.
(See Pneumatic Tools.)

Pneumatic Hose.
(See Air Hose.)

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Pneumatic Separators.
Griscom-Russell Co.

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Cleveland Pneumatic Tool Co.
Chicago Pneumatic Tool Co.
Independent Pneumatic Tool Co.
Ingersoll-Rand Co.
Oldham, Geo., & Son Co.

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(See Valves.)

Portable Drills.
General Electric Co.

Power Hammers.
Beaudry & Co., Inc.
United Hammer Co.

Power Punches and Shears.
Covington Machine Co.
Niles-Bement-Pond Co.

Power Riveters.
Independent Pneumatic Tool Co.
Oldham, Geo., & Son Co.

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Covington Machine Co.
Niles-Bement-Pond Co.

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Crane Co.
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Farley, Edward P., Co.
Hough, Edward S.
Rodberg, A. M.
Watts, J. Murray.
Young, Rakestraw & Ferguson.

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Kearfott Engineering Co.
Montague Iron Works.
Sheriffs Mfg. Co.
Trout, H. G., Co.
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(See Engines, Pumping.)

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Buffalo Steam Pump Co.
Connor, W. B., Inc.
Davidson, M. T., Co.
Dean Brothers Steam Pump Wks.
De Laval Steam Turbine Co.
Griscom-Russell Co.
Hyde Windlass Co.
Kinney Mfg. Co.
Lea-Courtenay Co.
Morris Machine Works.
Row & Davis, Engineers, Inc.
Sands, A. B., & Son Co.
Terry Steam Turbine Co.
Westinghouse Electric & Mfg. Co.
Wheeler Mfg. Co., C. H.
Worthington Pump & Mach. Corp.

Pumps, Bilge.
(See Bilge Pumps.)

Pumps, Dredging.
Terry Steam Turbine Co.

Punching Machines.
(See Power Punches.)

Punches and Dies.
Cleveland Steel Tool Co.
Covington Machine Co.

Punches, Shears and Bar Cutters, Combined.
Covington Machine Co.
Hanna Engineering Works.

Punching and Shearing Machines.
(See Power Punches and Shears.)

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Taylor Instrument Companies.

Quadrant Davits.
(See Davits.)

Radio Apparatus.
Cutting & Washington.
Livingston & Co., J.

Rafts.
(See Life Boats and Rafts.)

Railway Dry Docks.
Crandall Engineering Co.

Range Finders.
Cummings Ship Instrument Wks.
McNab Co., The.

Ranges.
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Williams, William E.

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Williams, William E.

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Morse Twist Drill & Machine Co.
Williams, William E.

Reamers.
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(See Gears.)

Reducing Valves.
(See Valves.)

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Brunswick Refrigerating Co.
Kroeschell Bros. Ice Machine Co.
Remington Machine Co.
Roelker, H. B.
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(See Valves.)

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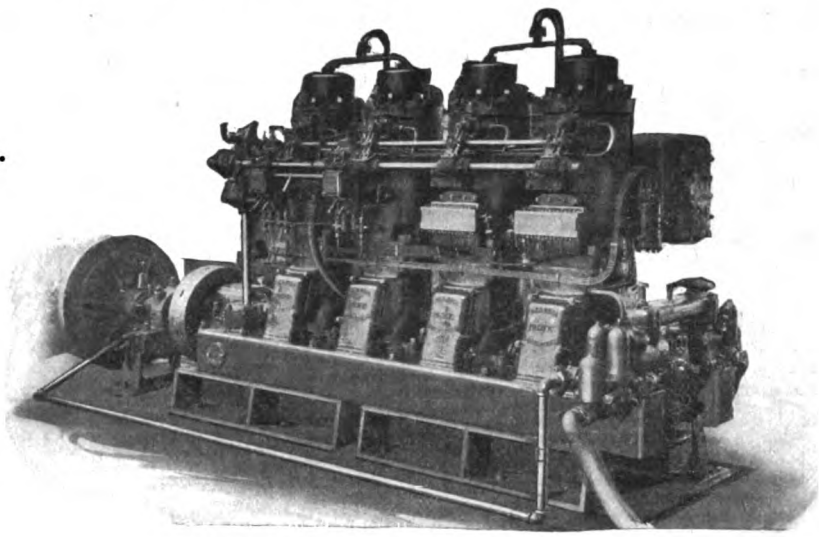

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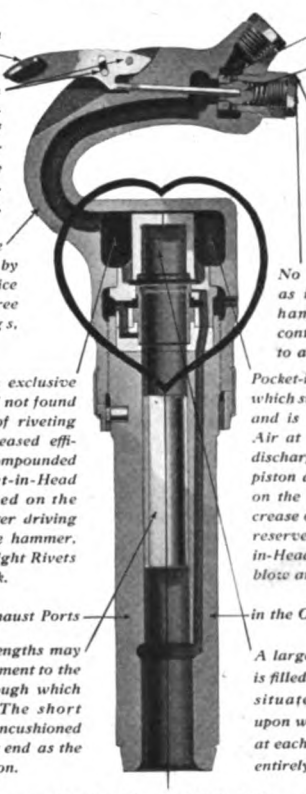

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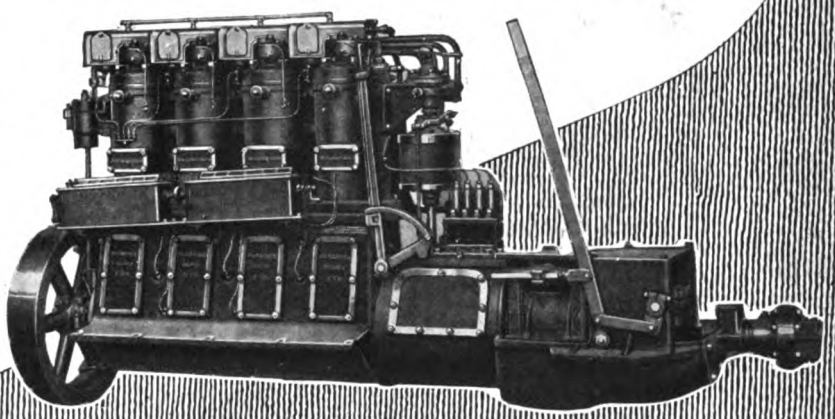

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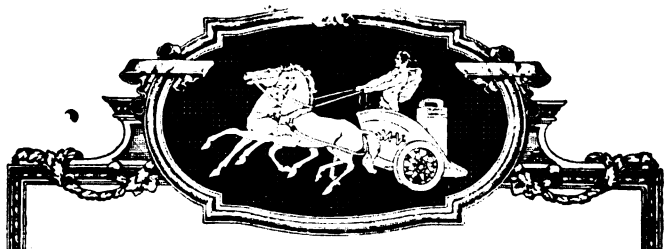

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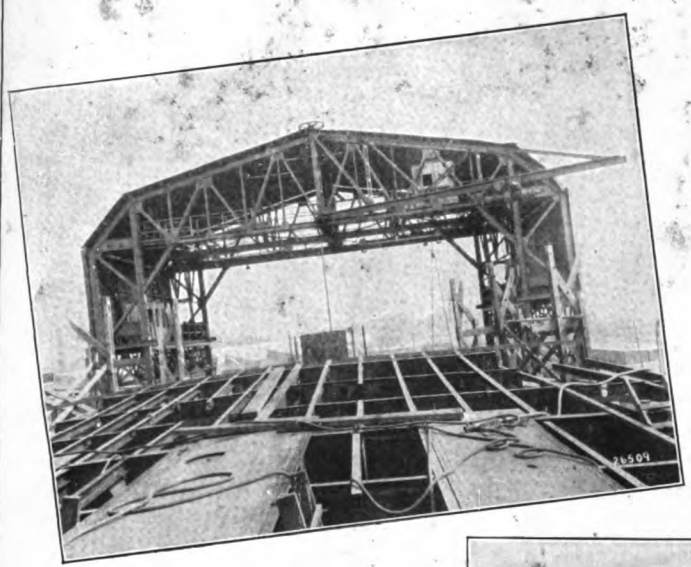
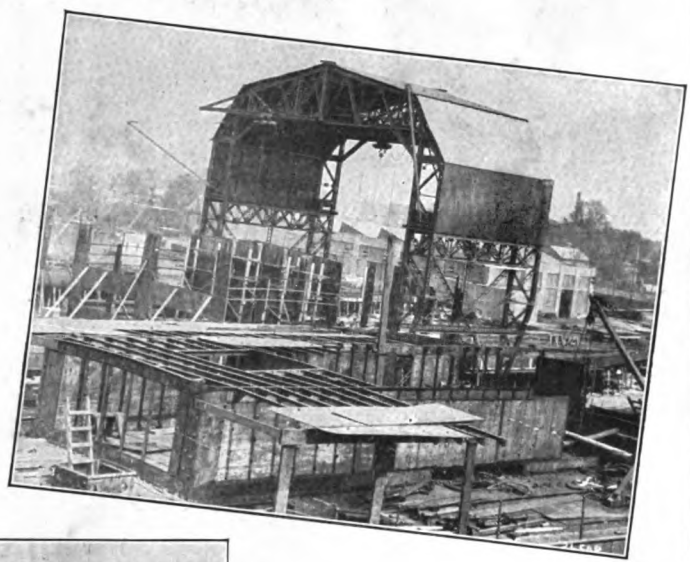
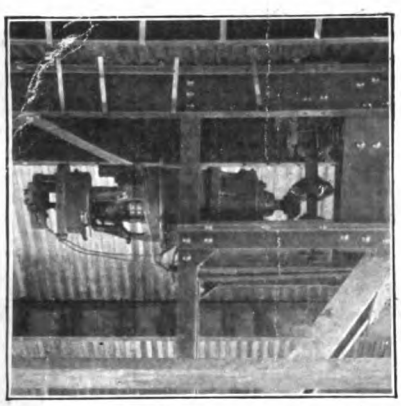
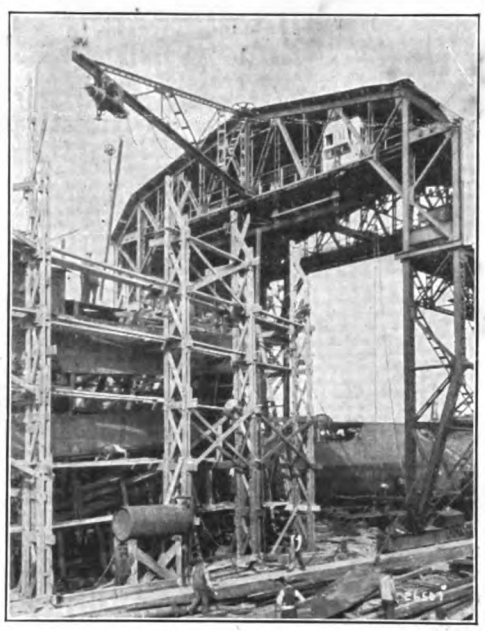






Back Geared Motor for rotating Boom of Jib Crane



Controllers located on a platform built in the Gantry Structure

At this Shipbuilding plant each Shipway is spanned by a huge Gantry Crane. On each crane are located two long reach Jib Cranes rotated by SHEPARD Back Geared Motors.

Operating on these Jib Cranes are SHEPARD double trolley long lift Hoists.

This plant is but one of many,—using SHEPARD apparatus.

Why not consult our engineers about your handling problem. No obligation of course. Or,—ask for illustrated data on SHEPARD Hoists for Shipyard Service.

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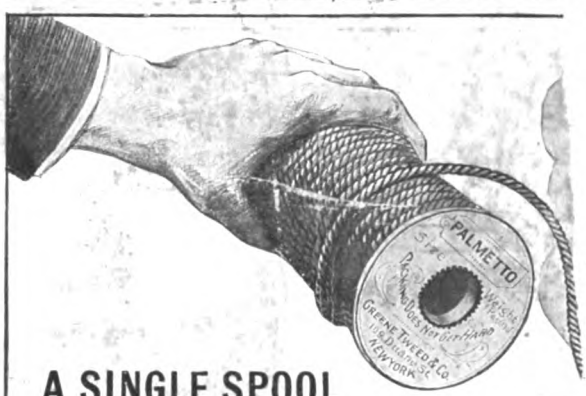

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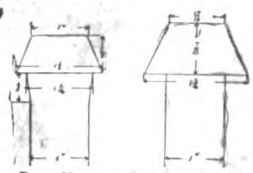

Champion Says:

The great advantage of using Swell Neck Rivets for Marine purposes is freely acknowledged by all the leading Ship Builders, and endorsed by them in their regular practice.

These rivets are made to fill holes in *punched plates*. The diameter of the punched hole on the *die side* is always slightly larger than the hole on the *punched side*. In other words, the *punched hole* is of *conical shape*.

In assembling, the plates are *reversed*, and by the use of Swell Neck Rivets the holes are completely filled, and the production is increased to a maximum, while the loss occasioned by loose rivets is reduced to a minimum.

The strength of the joint is further increased by the use of steel made according to Lloyd's, or U. S. Navy Specifications, which adds at least 5,000 pounds to the shearing strength, and 10,000 pounds to the tensile strength.

Our rivets conform strictly to specifications. We carry the largest stock of rivet bars and made up rivets in the world.

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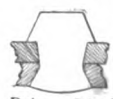

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